AUG 5 1942

FOOD INDUSTRIES

• FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

AUGUST 1942

Wartime Changes in Metal Containers

New Priority System Explained

The Little Things That Count in Food Technology

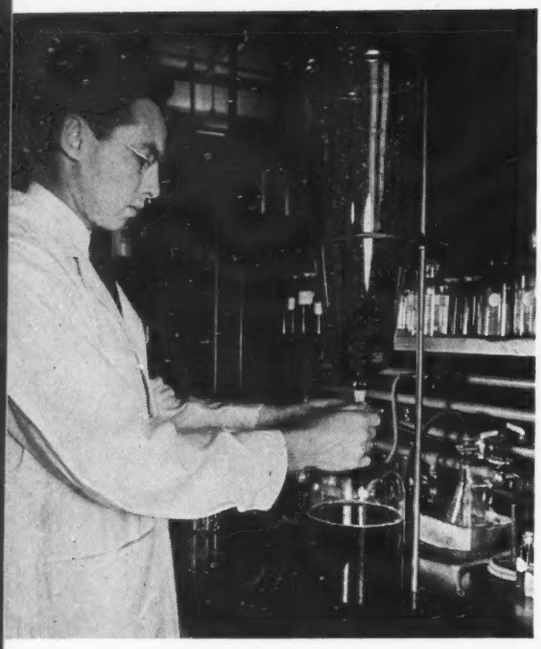
Dehydration Methods Used in California

Things You Should Know About Barrels

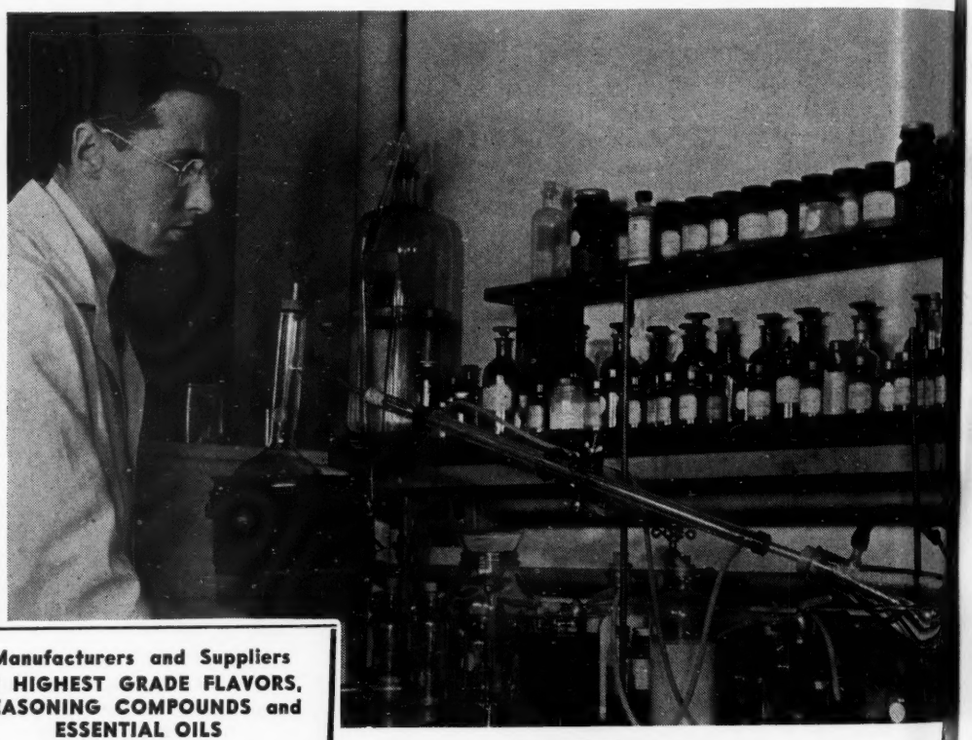
More About Food Plant Floors

A McGRAW-HILL PUBLICATION

BACKGROUND VALUES . . . a PART of the product, APART from the price

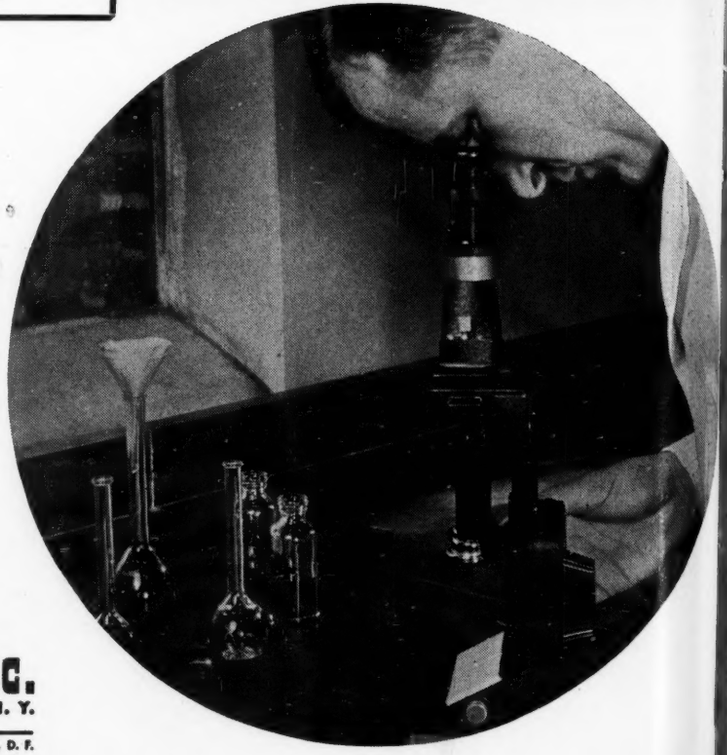


These three photographs illustrate a typical laboratory problem. An attempt is being made to produce an essential red color from domestic fruit products. Formerly, this food color was obtainable only from European sources. In the upper photo, a fruit by-product is being broken down by means of a special solvent. The center picture shows the extracted substance being concentrated by distillation. Colorimeter and comparison tests, illustrated in the bottom picture, enable the chemists to check correctness of strength and shade of materials thus produced with original specimen of imported color.



Manufacturers and Suppliers of HIGHEST GRADE FLAVORS, SEASONING COMPOUNDS and ESSENTIAL OILS

TIME and again during the past year of increasing shortages, our laboratories have been called upon to find substitutes for various essential but unobtainable formula ingredients. And usually they've found them! In doing so they've provided replacement materials enabling hundreds of manufacturers to continue supplying healthful, flavorful food products to a nation building for war. We and our customers are fortunate in having at our command, not only the matchless skill of our present laboratory personnel, but a full treasury of experience upon which to draw when dealing with the varied and difficult problems of replacement constantly confronting us. Manufacturers of sweet goods and beverages, of food concentrates, dessert powders and countless other edible products, will find this array of extraordinary talent an important factor in keeping their goods on the country's huge bill of fare in their most healthful, palatable forms. This background of talent is a distinct *part* of every Fritzsche product, *apart* from its price.



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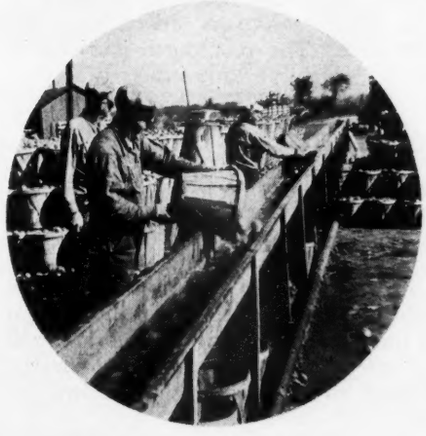

Nothing is more symbolic of food processing at this time of the year than is tomato canning. The picture on the cover shows baskets of tomatoes, just in from the fields, being dumped into a water conveyor which carries them into the cannery. This particular type of conveying has two quality control functions as well as a materials-handling function. The water prevents damage to the tender raw material and at the same time prewashes the tomatoes.

FOOD INDUSTRIES

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This Issue

This You Must Do

To get priority preferences for needed machines and materials, you must put on the orders a designation of the end use. For the food industries this designation is "14.00." It is essential that all food manufacturers understand the provisions and implications of WPB Priorities Regulation No. 10. What you need to know is told in an article on page 39 by an authority, W. B. Spooner, Jr., of Spooner and Kriegel, industrial consultants. You may recall Mr. Spooner's excellent fog-clearing article on priority preferences in January.

The Case of the Iron Kettle

Once upon a time—and this is no bedtime story—a cast-iron doughnut kettle suddenly caused the shortening to break down badly. Analysis of the fat showed copper to be present, yet there apparently was no copper in the kettle. It developed, however, that the manufacturer of the kettle had plugged blow-holes with a copper-bearing alloy. And under service some of the plugged holes broke through to the inside. Which is an example of the little things that count in food technology discussed in an enlightening article on page 41 by J. A. Dunn, technical director of Diamond Crystal Salt Co.

Answers to Tin Shortage

That something had to be done to reduce the amount of tin used in food containers is not news. But what is being done and what lies ahead in the way of changes in metal containers is effectively told in an article on page 57 by R. H. Lueck, director of research of American Can Co. Mr. Lueck goes into the steps taken to conserve tin and discusses bonderized steel, electrolytic tin plate and organic coatings.

More About Dehydration

They have a lot of dehydraters on the West Coast, these units being originally designed to preserve prunes, raisins, apples and other fruits. But now the units are utilized for vegetables.

How they operate is described in an article on page 50 by E. M. Mrak, a dehydration authority at the University of California. The author also discusses the technological problems of dehydration, gives some advice on how to store dehydrated foods.

The more known about proper dehydration methods and technics, the less likely is the dehydration industry to suffer from poor quality and die an untimely death at the end of the present emergency.

Coming

Convert Beer, Not Brewery?

In the May issue was an article telling how to convert a brewery to the manufacture of industrial alcohol. The setup suggested would exclude the manufacture of beer in the same process. But there is yet another way for brewers to make alcohol, and this method permits them at the same time to make beer. The idea is to produce a high-alcohol beer then partially dealcoholize it to get alcohol for the war effort.

How this type of conversion can be effected will be told by G. T. Reich, author of the May article, and Elsie Singruen, cereal chemist.

How Good is a Dried Egg?

Admittedly, one of the most vital problems facing the dehydrating industry is control of quality at a level that will gain consumer acceptance. For upon this attainment hangs not alone the success of the industry as a wartime effort but most certainly its future as a peacetime industry. The first requisite of quality control is a reliable method of grading the finished product with respect to eating qualities.

Such a method has been worked out for grading spray-dried eggs. This method will be the subject of an article in September, by Harry M. Slosberg, research department, Continental Can Co.

Well-dressed Belts

Leather belts must be kept dressed to prevent their fibers from drying out. And other precautions must be taken with leather and V-belts to get the most out of them, which is important now as never before. Fortunately, both leather belts and V-belts obey a few simple laws, and it is not difficult to make certain that your driven machines have the proper belt drive. The procedures involved in belt maintenance will be told in an early issue.

Keep It Under Control

In dehydrating vegetables it is extremely important that the temperatures and humidities in the dehydrater be controlled closely at figures predetermined to give the best results. Not too much can be said about this nor too great precautions taken in the drying operation. So to give you who operate dehydration plants the best information possible on controls for dehydraters, FOOD INDUSTRIES will publish an article on the subject by an expert on instrumentation who has made an extensive study of dehydrater controllers.

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FOOD INDUSTRIES

FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

LAURENCE V. BURTON, Editor AUGUST, 1942

The Talk of the Industry

● "THE Hygroscopic Dehydrating Company is the name of a new dehydration enterprise in Los Angeles, California. Wonder what system is utilized?

● VITAMIN PILLS have become a matter for collective bargaining in a strange manner. In order to maintain the health of its employees a certain

metal-working company proposed to provide a couple of pills per day for each employee, along with the customary salt pills for hot weather. But to accept these free would have been paternalism and the union would have none of it. The union must demand the pills as a concession from the employer. So the bargaining began, the union won its point, and everybody now gets plenty of vitamins free, and consumes them with evident gusto.

● WHERE to hold large conventions, like the January food industry conventions normally held in Chicago coincident with the National Canners Association, is an unexpected problem of war. For now that the Army has taken over the Stevens and Congress hotels in Chicago and most of the larger boardwalk hotels in Atlantic City, there are few other places to go. Cleveland, with its large municipal convention hall, lacks adequate hotel capacity but appears to be the best bet today—if, indeed, there are to be any more conventions.

As a matter of fact, however, there is no pressing need during the war to hold so many conventions simultaneously. A staggered program would contribute much to better quality and quantity of convention work.

● FORMULAS for various home preserves, published in a California farm publication, call for *California* beet sugar, albeit supplemented by corn sirup or mild honey. What, doesn't California produce corn or honey?

● WHILE we are on the subject of railroads we might as well pay our respects to the New York Central dining car service which sells strawberry SHORTcake made from sponge cake. (In case you don't know your baking technology, there is no shortening in sponge cake.)

Anybody who would call sponge cake a shortcake commits an offense unto Heaven!

● IT USED to be that AA was the highest possible priority rating, meaning Actual Allocation, with A-1-a, A-1-b, A-1-c, etc., next in order. It seems that the competition for A-1-a ratings has become so great that a new system has had to be created. Now the ratings become AAA, AA-1, AA-2, and so on, all of which take precedence over A-1-a. Anything that once had an AA rating now automatically gets the AA-2 rating. Folks who once held A-1-j ratings are now pretty far down the list.

The AA-1 series of ratings are, however, mainly applicable to military items or closely related non-military items.

● TO BE greeted on a dining car on the Pennsylvania Railroad with a printed notice that one may have only one cup of coffee at breakfast, and no more throughout the day, is one of the inconveniences of wartime travel. On the contrary, a grinning waiter on a C.&N.W. diner informs one, "Boss, you cain have 'leven cups ef you all wants to."

P.R.R. dining car stewards don't seem to know why Pennsy customers are short rationed on coffee except to

say that the supply is cut down to 70 percent of last year while traffic is up to 150 percent. But, it appears that this is only a partial explanation. Actually, the curtailment of supplies is based on limitation of purchases to a percentage of 1941 purchases. Pennsy had a big inventory of coffee last year and was working it off when other railroads were buying heavily. Consequently, P.R.R. coffee purchases were proportionately lower

than those of the other railroads.

All of which goes to show how difficult it is to avoid inequities when rationing on the basis of a previous year's purchases.

Requirements Committee Making Slow Progress

Up to now the FRC has done little other than to meet and consider the proper approach to its assignment. A skeleton organization has been set up. S. B. Bledsoe, a former newspaper reporter, becomes vice-chairman of FRC, but also doubles in another job, director of Office of War Relations. There has been a reshuffle of other jobs in the Department of Agriculture.

One wonders, however, who is going to do the work—and when?

Those Waste Collections —A Year Late

The current salvage of waste materials could have done much to relieve many a problem today had it been started when good technical judgment dictated.

In retrospect it is now apparent that the collection of waste fat from households as well as institutions should have begun long ago.

Despite the fact that every war in the past 75 years has resulted in a fat shortage and that every informed person, has known that soon we, too, would need more fats, the political force of the isolationists prevented doing the obvious. To have instituted fat salvage in 1940 would have been warmongering. But fat is only a case in point.

Take bones for another example. Little has been done yet to start a salvage campaign on bones. Nevertheless, button, gelatine and glue manufacturers have faced shortages of this raw material for a long time as a result of the marine shipping situation.

A plan to initiate household bone salvage was squelched over a year ago for the ostensible reason that it would supply German progagandists with verbal ammunition to confound us.

So much for hindsight. Let us begin now to save everything that can be saved. Not only must we conserve the supplies we possess, but we must save the discarded materials of no further use in the existing form. Rubber and metals are only a part of the needs. Fats, bones, boards, containers, closures, paper—yes, even more paper, despite its embarrassing surplus today—nails, pipe fittings; all are important to the war effort.

To wait until very acute shortages develop is to sabotage the war. Thoughtless individuals fail to realize that, with OPA price controls in effect, the warning signal of price increases is no longer to be awaited. Heretofore, we in the United States saved only when high prices caused us to cease a given use or waste; today this automatic control is gone. We must use our heads.

As the months pass by and further successes are won by Axis nations, the day of their defeat recedes into the obscure future. It should now be apparent to all that we are in for a very long war. The talk now is defeat of Germans in 1945 and of Japan in 1946. In another half-year you can expect to see another year added to the foregoing. Therefore, save now while you can.

In Which We Become Cynical About Ourselves

Back in NRA-AAA days it was apparent that we Americans, taken as a whole, were a bunch of economic nit-wits. For we had a set-up that required by law the attainment of ever-receding objectives. On the one hand NRA was to put a floor under wages so that urban workers could get enough money to reach a "decent" standard of living. On the other hand, AAA had for one of its major purposes the payment of "parity prices" to farmers—a legislative fic-

Hors d'Oeuvres

• Now they're putting an antioxidant into soap. But it's to keep the soap, not the user, from developing rancidity.

• *A Florida grapefruit canner is making speedboats, giving him another product that makes a splash.*

• Commando Foods, Inc., has just been formed. No doubt their products will be well suited to a raid on the pantry.

• *To find substitutes for bottle closures, experiments are being made with pressed sawdust, turned wood, cement, nylon and ordinary plastics. Why not seal bottles by fusing the neck under heat. The homemaker's old grouch could bite the neck off to get at the contents.*

• It has been calculated by "Phoenix Flame" that the pack of 40,000,000 cases of tomato products scheduled for 1942 would make a row of cans encircling the world twice, with enough left over to reach from Chicago to San Francisco. And Lease-Lend is doing its best to make those cans encircle the world.

• *Omar, Inc., Omaha millers and bakers, have crowned a "Midwest V Girl." She no doubt is full of vim, vigor, vitality, vitamins and voomph.*

• An RAF pilot dropped a few cans of American beer on Rommel's camp in the African desert. And that was after the English had contaminated waterholes with fish oil to make them useless to the advancing Nazis. One of these times they're going to annoy Herr Rommel.

• *There are tremendous stocks of canned milk on hand now. So not only the cows but the people ought to be contented.*

• The glycerine produced as a byproduct in making ten pounds of soap is the amount required for manufacturing six pounds of dynamite. So we'll use the soap and give the Axis the lathering.

• *According to one of the reporters recently released from Italy, food prices there have gone up until an egg costs 18 cents, a pound of ham $3.75 and a pound of tea $35. In Italy it is hardly worth the cost of living.*

• For purposes of canning the state rationing board in Virginia has classified rhubarb as a fruit and tomatoes as a vegetable. Oh, Mr. Webster!

• *Banana stocks are small, that is, bananas are short.*

• In a study of consumer reactions to graded beef, many people said that the sex of the animal should be stamped on the carcass. Who'd have thought that the sex of a bovine mattered except to another bovine.

• *A worker in an egg-breaking plant said she would "rather throw 'em than break 'em." Woe be to the foreman of the egg-breaking plant whose employees give vent to this suppressed desire.*

• Borden says early replacement of motor vehicle milk routes by horses is unlikely. Seems there's a shortage of horsepower on the hoof.

• *According to the Department of Agriculture, the European dairy situation continued to deteriorate during the past winter. Adolf has milked the continent pretty dry.*

F. K. L.

tion that the cost of things farmers bought in 1909-1914 in relation to the sales prices of farm commodities was about perfect. So NRA resulted in higher costs and higher selling prices to everybody, including farmers. And AAA required increasingly higher farm commodity prices to compensate for the higher cost of goods made in cities. But AAA made the cost of food for living go up and NRA, plus other legislative devices, such as the Wagner Act, forced wage increases, and this made higher prices for the things farmers bought.

Thus, there is an ever upward race, explained by many a pat simile, the best of which was a comparison to a cow with her feet stuck in the mud. By great effort she would get one foot loose at a time, only to find her other three feet stuck deeper. The AAA-NRA situation was hopeless of attainment however desirable might have been its stated objectives. It was hopeless because it required both ends of a seesaw or teeter-totter to go up together.

While there was apparent improvement in the buying power of both farmers and laborers, this was attained at the cost of government subsidies and a greatly increased national debt.

And now we are being plunged into another economic mess, infinitely worse. Our national internal economic problem today is, as you surely already know, the OPA price fixing plan without wage control, all beautifully messed up by the AAA parity-price fiction (now upped to 110 percent of the 1909 to 1914 ratio) and topped off by Congressional refusal to permit the sale of surplus grain at below-parity prices and refusal of subsidies to compensate for the "squeeze" on processors. In the current situation we have as absurd a legislative hodge-podge as our Toonerville Congress could devise.

In NRA-AAA days both ends of the teeter-totter were expected to go up. In today's monstrosity both ends are to go up while Leon Henderson's OPA is to hold down the middle. Something is going to bust. We are headed straight for inflation!

If the nation were not involved in a life and death struggle for its very existence it would be ridiculous. Who got us into it? Our *chosen* representatives in Congress, representatives and senators.

Who will get us out? Who will have the guts to repeal, to rationalize and straighten out the contradictions that are going to ruin everybody if they are permitted to persist? The present Congress? Don't make us laugh.

If the voters of the United States fail to turn out those now in office who are incompetent and elect real patriots who will do what is best for the nation, regardless of their own political future, then we are in for the sorriest days this country has ever known.

Conversion Completed—Concentration Next

You will hear a lot about plant concentration soon. It means concentrating the production of goods for the civilian economy in a few of the more efficient plants. The less efficient will be closed, the personnel disbanded and absorbed by the Armed forces or by war plants. The pattern of the future will be found in what has been done in Britain.

Plant conversion—the changeover from normal production to war production — is about completed, so Washington believes. This has come about more rapidly than seemed possible last March when the program was announced. Apparently raw material supplies for war goods are the limiting factor; it is possible to convert more plants than there is material enough to work upon. So the next step is to find the raw materials, which leads to cutting down on civilian-goods production.

In turn, this cutting-down procedure will mean many plants working at part capacity, with consequent high operating costs. To meet this problem the dope is that the amount of work available will be concentrated in the more efficient plants. Further than this there are no forecasts.

If the British experience continues to supply the pattern we shall follow, the favored plants will be operated at capacity and the profits allocated to the entire industry. Thus, a concern in Britain may be completely shut down yet be deriving a modest profit.

How far the plant concentration idea will be applied to the food industry does not yet appear. Perhaps the large demands for Lease-Lend food, as well as the essential nature of most of the food industry, will save it from a rigorous readjustment. Yet it is almost self-evident that duplication of services will be a red flag to the planners in Washington. In suggesting this, one does not overlook the recent noncooperative action of organized labor in sabotaging all efforts to eliminate duplication. Efforts to eliminate such economic waste will be revived and enforced when the plan of concentration becomes crystallized and is announced.

Compliments to Tennessee

Tennessee Agricultural Extension Service is doing a commendable job in making a study of processing, preservation and food-storage facilities in that state. To be sure, the duty of the Extension Service is to transmit to the farmers any orders from Washington to increase the farm production, but the extension workers refuse to permit themselves to be maneuvered into a position where they may have to take the blame if crop production outruns preservation and storage facilities.

In short the boys in Tennessee are in a position to talk back to Washington, and don't propose to be either the sheep or the goats.

How many other states have extension services with equivalent foresight?

Waste Disposal Vital For Dehydration Plants

Many newcomers to the food business are entering via the vegetable dehydration field, and because of their lack of previous experience they are apt to overlook certain very important features of the business. Not the least of those which are overlooked is the little matter of waste disposal, which is something that may bring a thriving new enterprise to a dead stop if it is not adequately provided for.

Nearly every state and most cities have regulations that prohibit creating public nuisances or polluting streams and waterways. It is not uncommon to fine an offender as much as $100 to $200 per day for continuing the practice.

Not long ago a potato dehydrator got into trouble by polluting a bay. So his next move was to pump the liquid waste onto a dry field. But this did not avail him much respite for the field became a public nuisance in two weeks.

Sanitarians have a measure of the nuisance of a liquid material. They measure its Biochemical Oxygen Demand (B.O.D.). This is a chemist's job, though any intelligent person can be taught the method. Citrus wash waters will average 15,000 to 20,000 parts per million, occasionally going as high as 40,000 p.p.m. B.O.D. Potato wash water often goes even higher. In an average industrial liquid waste the B.O.D. will run between 10,000 and 20,000 p.p.m.

War, or no war, the health authorities will not permit nuisances or pollution. The only remedy is to prepare to handle the problem before starting a new operation.

Wesson Loss Significant In Improved Processing

Every now and then, it is satisfying to note, some oldtimer is vindicated by the results of the work of those who have followed. Such a case was the work of David Wesson who, long ago, devised a test that would measure the irreducible, or theoretical, loss in refining a vegetable oil. This test, known as the Wesson Loss, has seldom been heard of around vegetable oil refineries until recently. The advent of continuous centrifugal refining and the Clayton process, employing nonsaponifying alkalies, brings the Wesson Loss test from obscurity into its proper significance.

Prior to the recent developments in oil refining, the divergence between the Wesson Loss figure and what the most skillful operator of a batch process could actually accomplish was so great as to make the Wesson Loss all but meaningless; it was an unattainable degree of perfection. Yet with the advent of continuous processing, supplemented by researches in colloid destabilization and improved food technology, it is now possible to reduce refining losses to unbelievably low figures, and do it on an industrial scale that closely approaches the Wesson Loss figure. This, be it noted, is presumably the theoretical minimum of loss.

Such progress is noteworthy. But it deserves an added comment here for a reason that we will share with our readers. It really is a sort of backroom yarn of the sort that W. R. Van Meter wrote about in the May issue of Food Industries.

Back in 1929 when Food Industries was only a year old and its editors as green as grass, a certain person summoned us to his place of business and tried to browbeat us into hiring him at a very fancy price to write a series of articles that would really wow the cash customers. His technique is not to be recommended to would-be authors, but it went this way: He turned the pages of an issue with such vigor that he actually tore some of them. Coming to an article by David Wesson his comments were even more virulent—"Who gives a damn what Dave Wesson thinks?" Then he contemptuously tossed this publication into the wastebasket. (The certain person did not get the solicited assignment and, oddly, soon thereafter lost his own job.)

That incident, so trivial that it was all but forgotten, was recalled to memory when we learned of the current significance of the Wesson Loss test. It would seem that Wesson has more on the ball than he was credited with.

To All Readers Of "Food Industries"

Every bit of the energy and ideas of this publication are devoted to the food industry's part in helping to win the war, and in keeping the American public alive, well fed and aggressive.

The No. 1 food industry problem is how to preserve perishable foods, or how to concentrate them to a volume small enough to get them on to the ships that remain afloat. For that reason dehydration will occupy a major portion of our attention until the job is licked.

Dehydration is a method of food preservation, little used commercially in the past, save for West Coast fruits, for apples in the East and for codfish and macaroni products. Yet it is applicable to a wide variety of products—fruits, vegetables, meats, fish, cooked foods, milk, cheese, macaroni, certain condiments, sugar beets, soups, eggs.

This method of preservation is needed today because of shortages of steel and rubber, and because the lesser volume and weight of dehydrated foods permits shipping more food overseas in the available ships. Furthermore, in military expeditionary forces the dehydrated food assumes an importance far greater than we who stay at home can foresee.

If your primary interest lies in fields of food manufacture other than the preceding list, you still may profit by watching the development of processing, packaging and quality control technics for dehydrated foods.

New Preservatives Needed

Active research is needed in the field of chemical preservatives. After about three more years of warfare on an ever-increasing scale this knowledge might be put to good use. New preservatives should be sought and their efficacy and limitations should be thoroughly explored *and made public* in suitable scientific periodicals. Investigations should cover two phases: (1) How little and under what conditions a chemical preservative is effective: (2) the pharmacology and toxicology, as well as method of analysis to determine the amount present.

Some of the so-called wetting agents that act as preservatives by the mere lowering of surface tension of the cells of microorganisms look very promising, provided it can be demonstrated that they are harmless. One such substance of unknown permissibility has been reported that acts as a sterilizing agent in amounts as low as about 50 parts per 1,000,000.

Before any new preservative can be legally utilized there is the vast problem of satisfying the Food and Drug Administration, as well as State food control officials, as to its benign character. Hence any superficial pharmacological studies will result only in official refusals. Whatever is done must be thorough, and be carried out by competent workers of high repute and without any bias.

To Deaerate a Powder

For many years we have had some notes on powder deaeration waiting for an opportune time for publication. In connection with the current efforts to compress flour, the occasion for presenting this fragment seems to be here.

It has been found by Colgate-Palmolive-Peet that a powder can be effectively deaerated by a mixer! Place the powder in a 1,000-lb. horizontal mixer, run it at 1 to 1½ revolutions per minute for half an hour.

On removal, however, every care must be taken to avoid re-incorporation of air, or the effort is made useless.

NEW WPB REGULATION AFFECTS ALL FOOD PLANTS

By W. B. SPOONER, JR.
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End use symbols and designation symbols must now be used on all food manufacturing plant orders, according to WPB Priorities Regulation No. 10. What this means is explained by the author in simple language.

NO MATTER what is ordered or where it is ordered, after July 1, 1942, no orders by food manufacturers will be acceptable by suppliers of any kind unless each of them carries a definite designation of end use. Moreover, *all* orders now in the hands of your *suppliers* for delivery after July 31st must be classified by *you* as to end use, before they can be shipped. Therefore, it will be necessary for all food manufacturing plants to understand the implications of WPB Priorities Regulation No. 10, which makes this allocation classification plan mandatory.

It is really not as complicated as it might seem. To get at the crux of the situation, producers of food products will utilize the symbol "14.00" to indicate that the end use of the materials, equipment, supplies and other things they order is in the food field. This symbol goes on *all* orders placed by the food manufacturing company, even though certain items to be ordered may have been identified with other end uses either by allocation classification symbols on orders from customers of the company, or by preference ratings indicating such other end uses.

In other words, you will pay no attention to end use symbols provided on orders to you by your customers, but hold to this symbol 14.00 on all orders you place. Symbol 14.00 covers the production or processing of all human foods. A detailed alphabetical list of the food products assigned this allocation classification symbol 14.00 is shown herewith in Table I. (Note that feeds for animals and fowls are assigned 13.00 under agricultural food use).

(There is also included a list of various industrial equipment and machinery, with the end use symbol assigned. See Table II.)

W. B. SPOONER, JR.

You may find that your particular products will call for some other end use symbol than 14.00 and, of course, you may be faced with the problem of a diversified group of products which might call for a number of different end use symbols, though this is not likely in the food field. In those comparatively rare cases where end use symbols cover more than one class, you are required to utilize the symbols for each of your products with different class symbols, where the volume produced exceeds 5 percent of your total volume.

However, if you are engaged in subcontracting, involving materials radically different from those in your regular line, it would be advisable to utilize the alphabetical guide in Priorities Regulation No. 10 to classify such items as directed there.

In addition to the end use symbols discussed above, there is another group of symbols which must also appear on each order. These supply the WPB with information as to whether the orders are placed for the Army, the Navy, Lease-Lend, Domestic Purchases, or Foreign Purchases other than Lease-Lend.

A series of five designation symbols are set up for this purpose. USA represents the Army; USN, the Navy, including the Maritime Commission; LL, Lease-Lend; FP, other Foreign Purchases; and DP, Domestic Purchases.

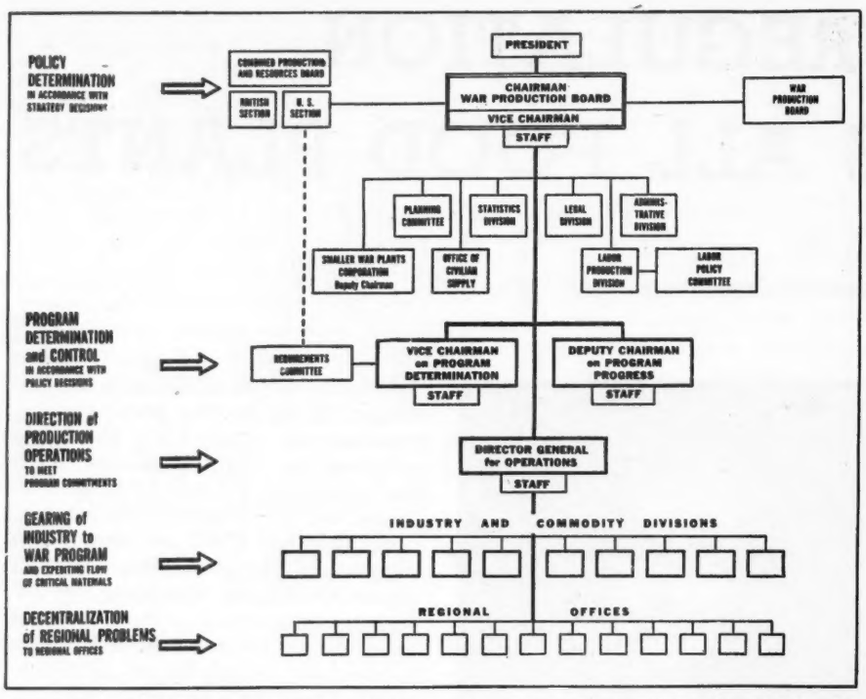
As the system is laid out, most of this last group of "designation" symbols will originate with your customers or customers' customers. In other words, if the Army has ordered anything from a supplier who in turn orders something *in connection with that order* from another supplier who comes to you, it is mandatory that the symbol "USA" shall be passed on in each case. The same applies to each of the other symbols in appropriate cases.

So when any such order comes to you with any of these "designation" symbols, you will in turn pass it on in connection with any order you make for supplies which are needed for the order you have received with this symbol.

However, you must *not* pass on the *end use* symbol you *receive* but instead use the one you are directed to use in Priorities Regulation No. 10, as indi-

List of Food Products According to Allocation Classification

	Allocation Symbol
Baking powder, yeast and leavening compounds	14.00
Beet sugar	14.00
Biscuits, crackers and pretzels	14.00
Bread and other bakery products	14.00
Candy and other confectionary products	14.00
Cane sugar	14.00
Canning and drying of fruits, vegetables, soups	14.00
Canning of fish, crustacea, mollusks	14.00
Cereal preparations	14.00
Cheese	14.00
Chewing gum	14.00
Chocolate and cocoa products	14.00
Condensed and evaporated milk	14.00
Cooking and other edible fats and oils	14.00
Corn sirup, sugar, oil and starch	14.00
Creamery butter	14.00
Curing of fish	14.00
Custom slaughtering	14.00
Feeds	13.00
Flavorings	14.00
Flour and other grain mill products	14.00
Food preparations	14.00
Ice cream and ices	14.00
Ice	14.00
Liquors, distilled, rectified or blended	14.00
Macaroni, spaghetti and noodles	14.00
Malt	14.00
Malt liquors	14.00
Meat packing (wholesale)	14.00
Non-alcoholic beverages	14.00
Oleomargarine	14.00
Poultry Dressing and Packing	14.00
Preserves, jams, jellies and fruit butters	14.00
Quick frozen foods	14.00
Rice cleaning, polishing	14.00
Salad dressing	14.00
Vinegar and cider	14.00
Wines	14.00



Organization of WPB, as realigned on July 8 to tie economic and military strategies more closely together and make more effective the Board's determination of policies and programs governing the flow of materials.

cated in the lists shown here in Tables I and II.

This is true in practically all cases, particularly in the food field. There are a few industries where the order specifically instructs the use of the end use symbol obtained from customers. These are listed in Table III and are practically all producers of machinery or equipment.

In using these symbols the five "designation" symbols are to appear first on the order, i.e., USA, USN, LL, DP or FP, followed by the appropriate end-use symbol. Thus, the order you issue where you have obtained a USA "designation" symbol will show "USA-14.00" to indicate that you are a food manufacturer who needs the product ordered to fill an order which will ultimately be used by the U. S. Army.

But where you are ordering material on which a passed-on "designation" symbol is not involved because you are ordering in quantity for anticipated needs, or because you had no way of relating your order to any "designation", then you will use the DP symbol.

Of course, if you are working on a direct Army contract and are the prime contractor, you will be authorized to use the symbol on orders to your suppliers. The same applies to both Lease-Lend and USN contracts.

Remember, however, that even in such cases, you will utilize the end use symbol called for by Priorities Regulation No. 10, even though the material you make goes directly into a product used by the Army, the Navy, or Lease-Lend.

Note also that you use the allocation classification symbol *applying to your industry for operating, maintenance and repair supplies*, and do *not* use the class 22 symbol designated for *manufacturers of* operating, building, repair and maintenance supplies.

You will find, however, that Priorities Regulation No. 10 specifies that where you function as a prime contractor and are ordering materials for a new building or for a building operation resulting from plant expansion, you will not use your regular industry coding, but instead will use the code 20.10. Otherwise, use your industry end use symbols, even for such building supplies. Ordinarily, your *contractor* will issue such orders and use symbol 20.10.

This applies to all industrial buildings except those that are Government owned and producing war facilities, in which case the class 7 symbol should be used.

The purpose of this new end-use coding of orders is the obtaining of data which will insure allocation of scarce materials on a basis compatible with war demands. You will find that once the system is well established, the data you obtain will be of great value to you in presenting your case to the WPB on form PD-25-A under the production requirements plan in particular, and in fact, on any other priorities application forms.

The PD-25-A form to be used for applications under the production requirements plan for the 4th quarter of 1942 will be set up to utilize the data obtained by this end use and "designation" symbol system.

In actual practice, since the responsibility of placing the symbol on the order is in the hands of the buyer, each seller should obtain adequate data for allocation classification by keeping a suitable record of the orders he receives. (You *cannot* put these symbols on orders from your customers. Only they can do this).

It is expected that the system will not work perfectly at first; but in view of its simplicity, and its mandatory nature, it should not take long for everyone who has passed through the priorities mill to use it readily and easily.

As a matter of fact, this system should be welcomed by industry as a whole because it will enable a great many firms in the food field that have had difficulty in establishing the full extent of their relation to essential war efforts, to show how extensively they are thus identified. For preference ratings were not necessarily always extended, since any supplier who could deliver a needed article or material without need for extending the preference rating he had received could break the chain which might otherwise have identified the last supplier in a long chain with essential war work.

Now, the group of five "designation" symbols which must be passed on in every case, at least insure identification with Army, Navy or Lease-Lend work where it is in the picture. Of course, since allocation symbols are not passed on, specific identification with definite war jobs is not as yet provided.

TABLE II—All Industrial Machinery Given Classification 20.20.

Here Are the Groups Listed:

Baking Machinery	20.20
Beet sugar machinery	20.20
Bottling Machinery	20.20
Brewhouse machinery	20.20
Butter making and butter working machinery	20.20
Cane sugar machinery	20.20
Canning machinery	20.20
Coffee grinding machinery	20.20
Coffee roasting machinery	20.20
Confectionery machinery	20.20
Cream separators	20.20
Food packaging machinery	20.20
Food products machinery	20.20
Ice cream machinery	20.20
Measuring instruments	20.20
Pasteurizers	20.20
Scales and balances	20.20
Special industrial machinery	20.20
Tobacco machinery	20.20

TABLE III—List of Industrial Equipment on Which the End Use Obtained From Customers Must be Transmitted:

Air Compressors
Barrels, drums, kegs
Batteries, storage and primary
Bearings
Bolts, nuts, washers
Conduit and Fittings
Cooperages, barrels, kegs, tubs
Diesel engines
Electric motors
Electric outlets, plugs, sockets, switches
Fiber cans and tubes
Furnaces, industrial
Gaskets
Gears
Generators
Internal Combustion Engines
Mechanical Furance Stokers
Oil Burners, Industrial
Power Boilers
Sinks
Valves

QUALITY CONTROL

Importance of Little Things • Avoiding Spoilage
In Wartime Storage • Digests of AMS Standards

It's The Little Things That Count*

* By J. A. DUNN
Technical Director, Diamond Crystal Salt Co., Inc.
St. Clair, Mich.

Off-flavors, rancidity, toughness and other troubles encountered in processed foods can often be traced to the presence of minute quantities of metals, acting as catalysts

ABOUT 15 years ago, while engaged in the study of agricultural biochemistry, I was told that there were certain minerals essential for plant growth and I was given a key so that I would never forget these essential elements:

C HOPKINS, Ca Fe Mg

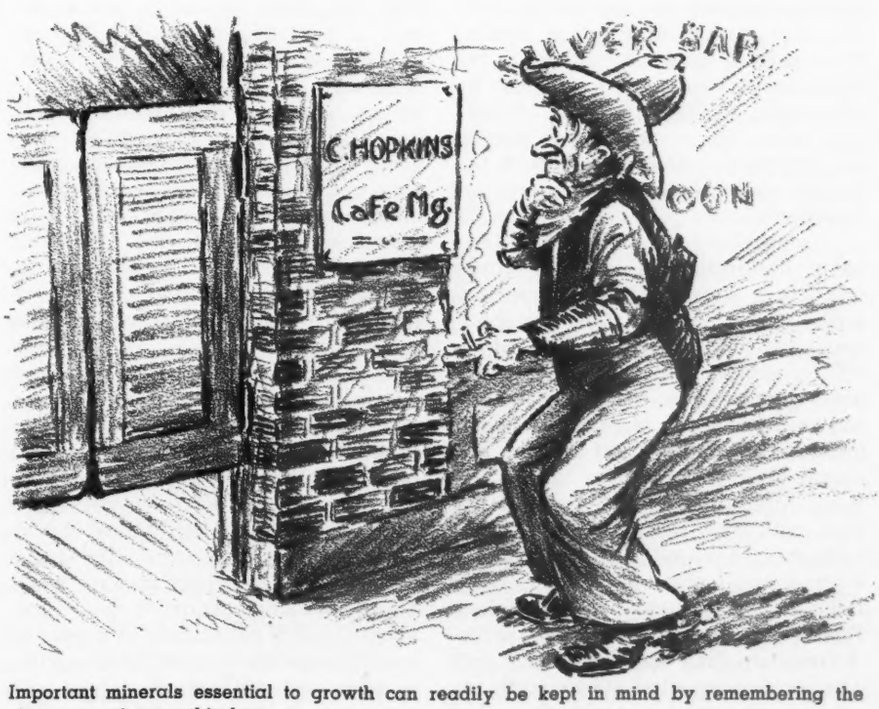
At that time, it was a simple matter to remember these elements, but today we find selenium, boron, manganese, copper, zinc, cobalt and indeed a host of others to which additions may be expected momentarily. I shudder to think of the horde of future masters of science and doctors of philosophy whose heads hang on the importance of these trace elements.

Why are these minerals essential for the growth and development of plants? Why is it that practically all of them are also essential for the normal growth and development of animals as well? Incidentally, I have the feeling that before we are through the two lists—one essential for plants and the other for animals—will approach identity. Because they all have a function, an essential job in plant and animal nutrition, we have them to contend with in every branch of food technology. The list is too involved and too lengthy to permit me to discuss all of these essential elements, but I should like to select just a few: Copper and iron, oxygen, calcium and magnesium.

If you will take the time to read over the various papers presented at the two Food Conferences which were held at Massachusetts Institute of Technology and from which the Institute of Food Technologists received its inception, and read as well the proceedings of the first two national I.F.T. conferences, keeping in mind just two elements—copper and iron—you will be surprised at the frequency with which they are mentioned. Before giving you specific citations, let's consider two of the more common chromoproteins, hemoglobin and chlorophyll. The first is, of course, the red pigment in the blood of animals and man and the second is the well-known green pigment so universally observed in the plant world. Each performs for its host organism essentially the same function; both are involved in respiration, acting as carriers of oxygen or in simpler terms, as catalysts.

These two familiar substances are strikingly similar in chemical composition. The principal difference is that hemoglobin contains iron, whereas chlorophyll contains magnesium which replaces the iron. It is generally believed that the red color of hemoglobin is directly associated with the iron and that the green color so characteristic of chlorophyll is directly associated with the magnesium. There are two other chromoproteins which I should like to mention in passing. One is found in the Crustaceae. This particular substance contains copper, replacing the iron. In another foodstuff, we find pinnaglobin in which manganese replaces the iron.

At our first annual meeting in Chicago, King and Tressler discussed the stability of vitamin C. They pointed out that there were certain enzymes, both of which were oxidases and both of which were copper-bearing proteins.



Important minerals essential to growth can readily be kept in mind by remembering the sign appearing on this bar.

* Based on a paper presented before the Chicago Section, Institute of Food Technologists, February 17, 1942.

It is of interest to every food processor that both of these actively destroy vitamin C, particularly during processing. King and Tressler made the following comment: "From a theoretic point of view, it is interesting to note that the enzymes most active in causing vitamin C destruction are characterized by their content of active copper." They also pointed out that two additional enzymes which can act on vitamin C to destroy it are apparently iron-containing catalysts.

Copper and Iron

My first introduction to this particularly active catalytic duo—copper and iron—resulted from my study of premature breakdown of doughnut-frying fat. Instances came to my attention by the dozen where frying fat would suddenly exhibit premature breakdown, becoming dark in color and developing a tallowy off-flavor. At the time, we could not understand why this should be the case. Considerable evidence was always available where other doughnut fryers were using part of the same batch of shortening without any trouble whatsoever. It was obvious, therefore, that some local condition was responsible for the trouble. An analysis of the ash of the spent frying fat revealed copper in amounts varying from 1 to 5 or even 10 parts per million. We also observed that wherever copper was present in significant amounts, we found considerably larger amounts of iron. Where copper was not present, we did not find iron present to any great extent. It seemed to us, therefore, that copper acted as a catalyst and enabled the free-fatty acid in the frying fat to dissolve the iron from the surface of the frying kettle. Subsequently, we found that by eliminating all copper, brass, bronze and other alloys containing copper, wherever they came in contact with the fat, we could eliminate this source of breakdown.

I remember one time that our theory was greatly shaken. I was hastily called to a doughnut shop where suddenly, without any warning, the shortening had broken down badly. A study of the equipment indicated that there were apparently no sources of copper contamination. An analysis of the fat revealed that copper was present and also a considerably larger amount of iron. After discussing this contamination with the manufacturers of the equipment I found that the cast-iron frying kettle had exhibited some blowholes but that these had not broken through to the inside of the kettle. Accordingly, they had been filled with a copper-bearing alloy. Subsequently, we emptied the kettle and with the aid of a magnifying glass, we could see that the thin layer of cast iron had gradually worn down with time and the copper alloy had been exposed. By replacing the kettle with a new one, the situation was rectified.

When the shortening in the doughnut kettle broke down badly, everyone was puzzled until it was discovered that a patched hole in the kettle was filled with copper-bearing alloy which acted as a catalyst. Just one of those little things that count.

Now, let's review some of the references to this indefatigable team—copper and iron—in our own food technology literature. Harrison indicated that spectroscopic analysis had revealed substantial amounts of copper where fruits have been sprayed for insect control. Tobey indicated that milk contains about 100 different constituents. And that 25 percent are of mineral nature. Copper is one of these. Harrison indicated that micro-analyses are being made by canning technicians searching for the cause of off-flavors, undesirable color, spoilage and similar difficulties. Parker indicated that salted butter occasionally develops a fishy flavor in cold storage and pointed out that acidity and metallic contamination are involved.

It is not generally recognized, but salt is quite likely to contain copper in small amounts and our own analyses indicate that the amount will range from less than 1 part per million in the purer brands to 5 or even 10 parts per million in the less refined brands.

Hunziker has indicated that traces of copper and iron have decided effects on the keeping quality of dairy products: 1½ parts per million of copper or even less can cause an off-flavor in milk; 4 parts per million of copper can cause a metallic taste. Milk normally contains 0.1-0.7 parts per million of copper. Butter may contain up to 10 parts per million. Such concentrations of copper are likely to result in an oily, tallowy or fishy flavor development upon long storage. Buttermakers know this and that is why the first churning each day is moved at once into trade channels and is never put in storage. It has been observed that the first churning will usually contain more copper than the remaining batches during the day's run and this fact doubtless accounts for the fact that the first run develops off flavor at a more rapid rate.

Vitamins and Minerals

We are living in the vitamin age and food technologists are, as a result, very much concerned about the lack of stability of certain of the vitamins. Those which are labile seem to be destroyed more by oxidation than by any other factor. Thus, we find exposure to oxygen, action of light, and presence of oxygen catalysts among the principal causes of vitamin destruction.

Elvehjem pointed out that vitamin A is affected by oxidation, Booher and Collison reported that 47-57 units of vitamin A per kilogram of body weight supplied the daily requirement under specific conditions when the vitamin A was derived from green peas, while 77 to 101 units were required when the source was cooked spinach. This apparent inconsistency might possibly be explained by the difference in concentration of copper and iron.

Elvehjem also indicates that vitamin E is very sensitive to light and oxidation. Almquist and Doisy reported that vitamin K is also destroyed by light and oxidation. Riboflavin also seems to be susceptible to destruction by light and oxidation. Vitamin B_6 also may be susceptible to destruction by oxidation. Fellers pointed out that it is well recognized that oxidation rather than heat is the vitamin destroying factor and he advised that any means of avoiding oxidation and enzyme activity will aid in conserving vitamin A. As already indicated, King and Tressler recommend the introduction of aluminum and stainless-steel equipment to replace copper and copper-contributing alloys. They point out that fresh, high-quality raw milk that is held in refrigeration without exposure to copper-containing equipment at any stage commonly loses about 10 percent of its vitamin C per day, but the rate of loss is much more rapid in market milk because of contamination with copper.

Sharp and Hand pointed out that oxidized flavor in milk can be prevented ordinarily by adding 50 to 100 parts per million of ascorbic acid, which is a very active anti-oxidant and reducing agent. They also point out that copper very actively catalyzes this reaction. They indicated that paper-cap flavor is associated with copper and probably with iron. Pederson, Beattie and Beavens reported that processed fruit juices have not remained stable because of the effect of heat, oxygen, natural fruit enzymes, the presence of metallic contamination and the effect of light.

Iron in Nutrition

I believe that I have presented sufficient evidence to indicate that copper and iron, even in minute amounts, should be eliminated, to the best of our ability, from the food products we are called upon to process. I am not unmindful of the importance of iron in nutrition. During the past two years, flour millers and bakers have been much concerned over the problems involved in the fortification of flour with nutritionally significant amounts of iron. Their research indicates, however, that there is a difference in the catalytic activity of iron depending on the chemical nature of the iron compound which is added. Ferric chloride should not be used because it is extremely active. On the other hand, iron-bearing compounds, where iron is combined with the anion group, seem to be relatively innocuous.

It is more than likely that we will be carrying on considerably more microanalyses in the future than we have in the past. We will be attempting to eliminate some of our processing difficulties on this basis. It is likely that copper and iron are not the only metals we will be searching for. Bitting indicates that galvanized iron equipment, for mixing sirups, for brine tanks, blanchers, steamers and other apparatus, is no longer approved. He indicates that copper kettles and vacuum pans are giving way to nickel, stainless steel, glass-lined tanks and other resistant materials. He pointed out that very small traces of metal may cause appreciable changes in production, although they cannot be easily measured by any of our present methods. He indicated that the asphalt-lined can, patented only 60 years ago to can shrimp, was a very crude one compared to the specially-coated container now used for various products and which makes possible the canning of items such as orange juice, pineapple juice and beer. Schuette and Zimmerman have studied the uptake of zinc from galvanized iron equipment by honey and they report significant amounts.

Trace Minerals Important

It is always a hazardous undertaking to foretell the future, but at the risk of "sticking my neck out," I should like to prophesy that as time goes on, we will be paying greater attention to small amounts of those mineral elements which are now known to be essential for plant and animal nutrition. I submit that the very reason why these trace elements are so essential is that they are associated with biological phenomena—with life itself—and for that reason, we may anticipate that they will also be associated with the *destruction* of vitamins, of enzymes, of flavors, and with the production of off flavor and off colors. We may find ourselves looking for traces of manganese, which has recently come to our notice because of its physiological significance. Foods rich in iron are generally good sources of manganese. Such foods include bananas, beans, beets, bran, carrots, celery, cucumbers, dates, eggplant, leafy vegetables, liver, nuts, oatmeal, onions, oysters, peas, peppers, raspberries, rhubarb, tomatoes and whole grains. Bear in mind that magnesium rather than copper is needed for the development of chlorophyll and, therefore, we may assume that it will be actively associated with oxidation phenomena.

Effect of Calcium

Now, let's turn our attention to another trace element which exerts a substantial effect on the quality of foods we process, namely, calcium. It is well known that calcium toughens vegetables and fruits which contain relatively high amounts of pectin. This fact is at the basis of the currently practiced method of increasing the drained weight of canned tomatoes by introducing small amounts of calcium. It has also been reported that calcium toughens canned shrimp and prevents softening. We cannot attribute this effect of calcium on shrimp as due to its action on pectin, since none is present in shrimp. It is more than likely that calcium also reacts with protein rendering it tougher and possibly more insoluble.

Bigelow and Stevenson have reported at length on the effect of hard water in canning vegetables. They indicate that increments of 200 parts per million of calcium will toughen canned vegetables significantly. They also point out that small traces of calcium definitely affect the ability of vegetables to take up and hold water—as bound water. Thus, they found significant differences in the drained weight of cooked dried beans. They reported that 250 and 500 parts per million of hardness in the water caused lower drained weights, and at the same time, caused a noticeable hardening of the beans themselves. As a result, we find water-softening equipment installed in canneries where the water shows any significant hardness.

A soft water may be defined as one which contains less than 100 parts per million of calcium. Hard water contains from 100 to 200 parts per million and very hard water contains larger amounts of calcium.

In studying the effect of hard water on canned vegetables, it suddenly occurred to me that the very same substances which cause water to be hard are those which occur as natural impurities in salt. Thus, we find calcium chloride, magnesium chloride, and calcium sulphate occurring in hard waters and we also find them as natural impurities in salt. The reason is obvious. Our salt deposits were doubtless caused by the evaporation of salt lakes and if the water in these salt lakes was soft, we have a relatively pure salt deposit. Thus, the deposits in Louisiana will probably run 99 percent pure, whereas deposits in Kansas, New York State and Michigan will not run more than 97-98 percent. Evidently, the water in the salt lakes which formed our northern deposits of salt was hard water. We may anticipate that rock salt brines will be relatively high in calcium and magnesium, and that as the purity of the salt increases, the amount of calcium and magnesium will decrease.

How significant is this effect of salt purity? Bear in mind that Bigelow and Stevenson of the National Canners Research Laboratories have shown that 200 parts per million of calcium is a significant amount. By simple calculation, you can show that in a 40 degree brine, which is equivalent to about a 10 percent solution of salt, a salt which is 99.96 percent pure will add about 40 parts per million of calcium to the brine. A salt that is 99.85 percent pure will add better than 150 parts per million of calcium. A salt that is 99.75 percent pure will add better than 250 parts per million. A salt that is 99.5 percent pure will add close to 600 parts per million and a salt that is 97.7 percent pure, typical of our Northern rock salt, would add about 2,500 parts per million of calcium. Also, keep in mind that this calcium contributed by the salt must be added to the calcium already present in the water as hardness. Here, we have the explanation for the fact, which has been known in a practical way for many years, that

(Turn to page 102)

Preventing Spoilage In Wartime Storage

By ERIC HARDY
Liverpool, England

Food storage in wartime creates unusual problems. This year's large crops and reduced transportation will mean crowded warehouses in America. Here are some of the methods used by Britain to avoid waste of her food reserves in storage

IN BRITAIN, food storage has reached a high standard because we knew at the outset that the enemy would try to starve us out by a blockade. Some very important lessons have been learned over here about wartime food storage. Briefly they are these. There must be a nation-wide storage system, coordinated by a national control body, such as our Ministry of Food. When warehouses and food factories are carrying larger stocks of food than usual there is a great increase of vermin, encouraged also by war conditions such as air raid damage, so there must be efficient pest control supervision. There must be a central insect control body, with qualified biologists and mycologists of wide experience in industrial biology at the head. There are three phases, one dealing with rodent control, chiefly rats and mice, and the others with control of insects and of molds and bacteria. They make regular inspections, investigate complaints and recommend methods of checking infestation. An association of vermin poison and bait manufacturers, rat-fumigators, and so forth, works under contract.

When food cargoes arrive at a port or warehouse, they are examined by entomologists to see if they harbor any dangerous insect pests, or insects previously unknown here. Prompt action by these entomologists has already checked at the ports some that might have become nationally serious.

Food supplies are scattered to avoid loss by fire and air raid damage. Vacant basements of old mills and other buildings in out-of-the-way towns are used to store food reserves, which are inspected periodically. The cold storage system and equipment have been nationalized, so that all resources can be used to the best general advantage. Under war conditions and with limited shipping space, food supplies cannot always be placed in rat-proof buildings, insulated transport trucks or ships specially designed for special food cargoes. Then the pest question becomes most important.

Worst Fifth Columnists

Bacteria, molds, fungi, insects, mites, rats and mice are the worst fifth columnists the wartime food industry has.

The Ministry of Food recently passed an order making it compulsory for owners of warehouses, food conveying vehicles, and so forth, to take steps to get rid of rats or insects following a complaint from a pest officer, and if such steps are not satisfactory, the premises or business can be closed by the officials until pest free.

Rodents

In dealing with rats we found that there was a shortage of sheet metal for rat-proofing, but asbestos and three-ply wood make good emergency substitutes. We found a shortage of liquid red squill poison baits, because they are imported, so we use minute quantities of white arsenic, too small to endanger human life. We found that even unbaited traps were successful when set with skill.

Regular and persistent trapping, with plenty of traps, baited daily with bait that differs from the local food supply and set in their regular haunts, is the only method that has brought results against mice.

Insect Infestation

We are not so heavily endowed with food pests as the U.S.A., but in this country there are some 50 insects harmful in warehouses and 31 insects attacking flour. We have 71 beetles which damage stored foods, one small beetle, *Ptinus testus*, alone attacking 116 stored products, and one mite, *Tyroglyphus farinae*, attacking 147. You may not think these creatures are of interest in America, but the insect pests of stored foods are cosmopolitan in their distribution. Despite man's efforts to check them, they are distributed throughout the world by commerce, ships, goods in transit, and so on. They know no national barriers, and a new pest in England has to be guarded against by America, and vice versa. The trouble generally starts when an insect changes its diet to some nearby stored food and sticks to it, like the cacao moth, which became a tobacco feeder in the last war and is now a world pest.

Temperature control is much used to check insects in food supplies that might be harmed by the use of chemical poisons or fumigants. Most of the insects occurring in flour and grain can be destroyed by maintaining a temperature of 118 to 125 deg. F. for several hours, warehouse mites by 150 deg. F. for one hour, pea and bean weevils by 146 deg. for 15 minutes, and most other food-storage weevils by 122 deg. A temperature of 130 deg. F. destroys cockroaches and steam bugs, 140 deg. larder or bacon beetles which attack ham. An hour or two at 122 to 131 deg. F. will destroy all cereal pests, which, incidentally, can often survive fumigation with the hydrocyanic acid gas used so effectively against rats. Foods unsuitable for exposure to the high temperatures can be exposed to slightly lower temperatures for a longer period; for instance, if 140 deg. is the minimum for instant destruction, 5 minutes at 124 deg. will prove equally effective.

Wet seed can be raised to 140 deg. and dry seed to 150 deg. without impairing fertility.

The heat can be obtained by installing steam-pipe radiators, allowing one foot of radiating surface for 50 to 100 cu. ft. of storeroom space, with a steam pressure of 25 to 50 lb. The temperature should be raised just above the required figure to allow for even distribution in the building. One treatment a year is generally sufficient.

If infested food cannot be rid of its pests by high-temperature sterilizing—rice, for instance, cracks under heat and becomes unsuited for milling—then low temperatures may be used with effect, as when rice is infested with weevils. Knowledge of the "dormant temperature," at which particular insects are not active, enables us to use certain storage temperatures that avoid the risk of infestation of sound foods. For example, storing goods at 64 deg. F. protects them against pea and bean weevil damage, 40 deg. F. protects against most small moths.

Molds and Bacteria

Molds, like insect pests, are generally kept at a minimum by adequate ventilation and humidity control in storage. Close, humid atmospheres breed molds, and failure immediately to remove mold-infested food leads to the infection of other foods by the spores. Conditions alternating between moist and dry atmospheres encourage rapid mold spread, because molds grow best in damp surroundings but bear their spores and infest new haunts in dry conditions. Much is risked by unwise storing of different foodstuffs of similar chemical base together. For instance, the molds which prey upon copra will prey upon butter, for both these contain the same type of fat. Unlike insect pests, some of the food molds continue to grow below the freezing point. Airtight containers are the best protection against mold. Stored butter is liable to considerable damage without a preservative.

Wartime Britain has seen an increase of complaints about mold in jam, preserves and pickles. With limited sugar supplies, people have tried to make their ration go further, and making jams and pickles without the full concentration of sugar or brine has left "vacant water" where mold spores, ever present, have grown.

A study has been made of molds in jams, preserves and pickles. Despite their high water content, jams will not contain mold growth if a high concentration of soluble material like sugar renders the water unavailable to the fungi. The concentration of sugar in the finished preserve (or brine in the pickle) must be 65 percent to insure sterility. A concentration only slightly less will encourage Aspergillus molds, as English housewives have discovered to their sorrow. Storage conditions may also encourage jam molds. If packs are exposed on one side to heat from the sun, hot-water pipes, and what not, and water migrates from the cool to the warm side of the jar, the extra water on the warm side gives room for the germination of mold spores there.

Cans of rice, and probably other foodstuffs, can be contaminated after sterilization by a polluted water supply used for cooling the tins, and in such cases this will encourage bacteria to develop inside the cans, causing bulging and even bursting in storage.

Evaporated, dried and condensed milk products are the only efficient wartime means of storing to retain the food balance of the original milk, when refrigeration facilities are far less than in normal time, and transport facilities are also affected. Under favorable storage conditions a hard cheese like cheddar will keep a year or more, so that despite its deficiency in food values, cheese has storage advantages over raw milk, butter or cream. Parmesan is the hardest cheese. Soft and unripened cottage types of cheese have to be stored under low temperature to safeguard against bacteria and mold.

Fresh fruits and vegetables keep better in refrigerated storage when the air of the room is modified with respect to the proportions of carbon dioxide, oxygen and nitrogen, or "gas refrigeration." Fish keep better when packed in ice containing 0.05 to 0.1 percent sodium nitrite, as it checks bacterial spoilage. Flour keeps much longer by vacuum drying first instead of storing at ordinary moisture content.

British-Combine

Careful handling and frequent inspection keep Britain's essential food reserves safe from damage by insects and rodents

Brief Summaries Of AMS Standards

For the convenience of those who control quality in the food industries, the following digests have been prepared of the standards issued by the Agricultural Marketing Service

ABSTRACTS containing the principal requirements of the standards issued by the Agricultural Marketing Service of the U. S. Department of Agriculture are prepared by FOOD INDUSTRIES. Those that follow and those which appeared in the August, September, October and November, 1941, and July, 1942, issues are a continuation of the series begun in 1940.

The complete text of the standards can be obtained from the AMS, located in Washington, D. C.

Dried Peaches

(Tentative)

DRIED PEACHES are the halved, properly pitted fruit of the peach tree (*Prunus persica*) from which the greater portion of moisture has been removed. Before packing, the dried fruit is processed to cleanse the fruit and is sulphured sufficiently to retain a characteristic color. The finished product contains not more than 25 percent moisture by weight.

Dried peaches may be of the following types and varieties: Muir variety freestone; Lovell variety freestone; other freestone varieties or mixed freestone varieties, and clingstone.

Inspection certificate shall indicate the size or combination of sizes found upon examination. The various sizes of dried peaches are as follows:

No. 1 (Jumbo)—2 in. or larger in diameter

No. 2 (Extra Fancy)—1¾ in. to 2 in. in diameter

No. 3 (Fancy)—1½ in. to 1¾ in. in diameter

No. 4 (Extra Choice)—1⅜ in. to 1½ in. in diameter

No. 5 (Choice—1⅛ in. to 1⅜ in. in diameter

No. 6 (Standard)—Less than 1⅛ in. in diameter

In determining compliance with size requirements listed above, dried peaches will be considered as of one size if not more than 10 percent by weight of halves vary from the size range.

U. S. GRADE A or U. S. FANCY dried peaches possess a practically uniform color in which the predominating color is characteristic of dried peaches when prepared from properly matured fruit. Not more than 7 percent by weight of the dried peaches may be damaged by discoloration, sunburn, hail marks, scab, disease, insect injury or other defects; not more than 2 percent by weight may be slabs; not more than 3 percent by weight may be immature; not more than 3 percent by weight may possess pits or pieces of pit or may be affected by mold, imbedded dirt, insect infestation or other foreign material; and not more than 1 percent by weight may be affected by decay. The total of all defects mentioned herein, within the limits prescribed above, shall not exceed 10 percent by weight.

U. S. GRADE B or U. S. CHOICE dried peaches possess a generally uniform color in which the predominating color is characteristic of dried peaches when prepared from properly matured fruit. Not more than 10 percent by weight of the dried peaches may be damaged by discoloration, sunburn, hail marks, scab, disease, insect injury or other defects; not more than 3 percent by weight may be slabs; not more than 6 percent by weight may be immature; not more than 4 percent by weight may possess pits or pieces of pit or may be affected by mold, imbedded dirt, insect infestation, or other foreign material; and not more than 1 percent by weight may be affected by decay. The total of all defects mentioned herein, within the limits prescribed above, shall not exceed 15 percent by weight.

U. S. GRADE C or U. S. STANDARD dried peaches possess a good color in which the predominating color is characteristic of dried peaches when prepared from properly matured fruit. Not more than 15 percent by weight of the dried peaches may be damaged by discoloration, sunburn, hail marks, scab, disease, insect injury or other defects; not more than 5 percent by weight may be slabs; not more than 10 percent by weight may be immature; not more than 5 percent by weight may possess pits or pieces of pit or may be affected by mold, imbedded dirt, insect infestation or other foreign material; and not more than 2 percent by weight may be affected by decay. The total of all defects mentioned herein, within the limits prescribed above, shall not exceed 20 percent.

OFF-GRADE dried peaches are dried peaches that fail to meet the requirements for U. S. GRADE C or U. S. STANDARD.

An explanation of terms used in the standards is also included.

EFFECTIVE: June 1, 1942
ISSUED: April 24, 1942

Canned Peas

THE standards of identity, fill of container and quality for canned peas, promulgated by the Secretary of Agriculture under secs. 401 and 701 of the Federal Food, Drug and Cosmetic Act of June 25, 1938 [21 U. S. C. ss 341 and 731 (e)], by orders issued February 23, 1940 (5 F. R. 739–741), and any revisions or amendments thereof, or other standards hereafter promulgated pursuant to the Federal Food, Drug, and Cosmetic Act, are hereby adopted for the purpose of these grades.

Canned peas are of two types:

Early peas are peas of early maturing or other smooth skin varieties.

Sweet peas (or Sugar peas) are peas of later maturing, wrinkled varieties which have a natural sweet flavor.

U. S. GRADE A or U. S. FANCY canned peas are peas of similar varietal characteristics which possess a normal flavor and which are of such quality with respect to clearness of liquor, uniformity of color, absence of defects and maturity as to score not less than 90 points when scored in accordance with the scoring system.

U. S. GRADE B or U. S. EXTRA STANDARD canned peas are peas of similar varietal characteristics which possess a normal flavor, are reasonably free from defects, are reasonably tender, and are of such quality with respect to clearness of liquor and uniformity of color as to score not less than 75 points.

U. S. GRADE C or U. S. STANDARD canned peas are peas of similar varietal characteristics surrounded by liquor which may be cloudy, possess a typical color which may be variable, are fairly free from defects, may be starchy, possess a normal flavor and score not less than 60 points.

OFF-GRADE canned peas are peas that fail to meet the requirements of U. S. GRADE C or U. S. STANDARD.

Canned peas that fall below the Standard of Quality promulgated

under the Federal Food, Drug and Cosmetic Act shall be certified with the additional statement, "Below Standard in Quality," together with the reason for so certifying.

Canned peas shall be considered standard in fill if the container is so filled that, when the peas and liquid are removed from the container and returned thereto, the leveled peas (irrespective of the quantity of the liquid), 15 seconds after they are so returned, completely fill the container. A container with lid attached by double seam shall be considered to be completely filled when it is filled to the level 3/16 in. vertical distance below the top of the double seam; and a glass container shall be considered to be completely filled when it is filled to the level ½ in. vertical distance below the top of the container. Canned peas that do not meet the fill of container requirement for canned peas shall be certified "Below Standard in Fill."

Federal inspection certificates covering canned peas shall indicate the size or combination of sizes found upon examination. The various sizes of canned peas are as follows:

No. 1 size peas are peas that will pass through a screen of 9/32-in. mesh.

No. 2 through 10/32-in., not through 9/32-in.

No. 3 through 11/32-in., not through 10/32-in.

No. 4 through 12/32-in., not through 11/32-in.

No. 5 through 13/32-in., not through 12/32-in.

No. 6 through 14/32-in., not through 13-32-in.

No. 7 size peas are peas that fail to pass through a screen of 14/32-in. mesh.

The grade of canned peas may be ascertained by considering, in addition to the foregoing requirements, the following factors: Clearness of liquor (10 points), uniformity of color (15 points), absence of defects (30 points) and maturity (45 points). The relative importance of each factor has been expressed numerically on a scale of 100. The essential variations within each factor are so described that the value may be ascertained for each factor and expressed numerically.

The factor of clearness of liquor shall be disregarded in grading "vacuum packed" peas. The other three factors shall be scored and the total multiplied by 100 and divided by 90, dropping any fractions, to determine the "total score."

The factor of absence of defects has reference to the degree of freedom from harmless extraneous vegetable material (such as pea pods and thistle buds), broken peas and spotted or otherwise discolored peas (creamy-white or vivid green). The pea seed is considered unbroken if the two cotyledons are held together by the skin, even though the cotyledons may be cracked or partly crushed or the skin split.

The determination of maturity in the A and B classifications is based on a brine flotation test.

When certifying samples which have been officially drawn and which represent a specific lot of canned peas, the grade will be determined by averaging the score of all containers, provided not more than one-sixth of the containers fail in some respect to meet the requirements of the grade indicated by the average score.

However, none of the cans may fall more than 4 points below the minimum score for the grade indicated by the average score, and if one-sixth or less of the containers fail to meet the requirements of the indicated grade by reason of a limiting rule, the average score of all containers for the limiting factor must be within the range for the grade indicated by the average total score.

This tolerance does not apply if any container falls below any applicable standard of quality promulgated under the Federal Food, Drug and Cosmetic Act.

EFFECTIVE: May 1, 1942
ISSUED: April 4, 1942

Canned Orange Juice

CANNED ORANGE JUICE is composed of the unfermented juice obtained from properly matured fresh fruit which has first been properly washed, may be packed with or without the addition of sugar and is sufficiently pasteurized to assure preservation of the product in hermetically sealed containers.

U. S. GRADE A or U. S. FANCY canned orange juice possesses the color of fresh pressed juice, not lighter than plate 9, L-4,, nor darker than Plate 10, L-8, as illustrated in Maerz and Paul's "Dictionary of Color." The juice is practically free from defects, containing not more than 10 percent free and suspended pulp when determined according to the method outlined herein. The juice tests not less than 10.5 deg. Brix, if unsweetened, and not less than 13.5 deg. Brix, if sweetened; contains not less than 0.70 percent and not more than 1.3 percent acid calculated as anhydrous citric acid, except that the juice may contain up to 1.6 percent citric acid, provided the juice has been packed from fruit meeting the maturity requirements of the State in which the fruit was grown; contains not more than 0.030 percent by volume of recoverable oil; possesses a normal canned orange juice flavor; and scores not less than 90 points when scored according to the scoring system.

U. S. GRADE C or U. S. STANDARD canned orange juice possesses a good color which is not darker than Plat 10, L-10. The juice is reasonably fre from defects, containing not more than 15 percent free and suspended pulp. The juice tests not less than 10.0 deg. Brix, if unsweetened, and not less than 13.5 deg. Brix, if sweetened; contains not less than 0.65 percent nor more than 1.6 percent acid calculated as anhydrous citric acid; contains not more than 0.050 percent by volume of recoverable oil; possesses a normal canned orange juice flavor; and scores not less than 70 points.

OFF-GRADE canned orange juice is orange juice that fails to meet the requirements of U. S. GRADE C or U. S. STANDARD.

Containers of orange juice shall be packed as full as possible without impairment of quality and shall be certified as "Below Standard in Fill" if the product occupies less than 90 percent of the volume capacity of the container.

The grade of canned orange juice may be ascertained by considering, in addition to the foregoing requirements, the following factors: Color (35 points), absence of defects (35 points) and flavor (30 points). The relative importance of each factor has been expressed numerically on a scale of 100. The essential variations within each factor are so described that the value may be ascertained for each factor and expressed numerically.

The factor of absence of defects deals principally with workmanship. The presence of particles of membrane, core, skin, seeds, "rag" or other residue is to be reflected in the scoring of this factor. The factor relating to flavor and aroma of canned orange juice shall be classified from the standpoint of palatability.

"Properly matured" means that the juice has been prepared from fruit meeting the maturity requirements of the State in which the juice is declared to have been packed, as well as the requirements of the Federal Food, Drug and Cosmetic Act. If the State maturity requirements are not met, certificates of grade shall bear the following legend: "Grade not certified account failure meet maturity requirements of State of ....."

(Turn to page 109)

Quick Freezing Offers Wartime Economies

By FRANK APP
Deerfield Packing Corp., Bridgeton, N. J.

The distribution of vegetables in frozen form requires less labor, less critical materials and less transportation capacity than distribution in cans or as fresh produce. Data showing the savings are taken from the experience of a company that has distributed large quantities under all three systems

NATIONAL welfare would be better served if quick freezing were uniformly used. This is true particularly because of the present shortages of labor and materials and also because of the natural efficiency of the freezing method of preserving and marketing vegetables. In overall efficiency, freezing ranks above either canning or fresh vegetable production and distribution for a portion of the industry.

While expansion of the freezing industry would call for added equipment, the saving of materials, such as the steel used in canning, is much more than enough to compensate for the new equipment needed in the first year's operation.

It would seem desirable, therefore, that a comprehensive appraisal of the perishable food situation be conducted immediately to serve as a guide for present operations and additional provisions for expanded requirements. Such a study might at the same time furnish a permanent and better system of food distribution for the nation in peacetime. This appraisal should include all the functions of the perishable food industry as well as the established systems of distribution. A major shift from canning to quick freezing with no provision for distribution would be wasteful for the nation.

Each of the three systems of producing and distributing vegetables has a definite place in the needs of the nation. No one system excels in all cases. However, the production of vegetables for freezing or canning is largely a machine operation, whereas that for fresh vegetables entails much manual labor. For crops such as lima beans that require hand harvesting when marketed fresh, the amount of labor is many times that for harvesting by machines for processing. And in addition to the labor of harvesting, peas are usually broadcast when seeded for processing. This saves the labor of inter-tillage and increases the yield. Similar comparisons might be made with other vegetables, some of which have little difference in labor requirements. But the overall picture favors processing to a substantial degree.

Seabrook Farms was originally organized for the production and marketing of fresh vegetables. Later the company encouraged a large canning operation to locate on their property and produced some crops for canning. Then when curtailment of the market for fresh and canned vegetables took place in 1932, the company sought a better system of marketing, which it found in quick freezing. Deerfield Packing Corp. was then organized as an affiliated company of Seabrook Farms. The success of this marketing venture in furnishing an outlet for vegetables in southern New Jersey is without equal in any other area. Seabrook Farms itself produces about 20,000 acres of vegetables and it contracts with about 800 neighboring farmers for an additional 15,000 acres.

Out of this vast experience, the company has learned the relative costs of marketing fresh, canned and frozen vegetables, data on which are given in the accompanying tables and charts. The cost of producing peas for the fresh market versus quick frozen peas is given in Table I. Of course, the labor of processing is an additional charge for quick frozen vegetables over those sold fresh. However, this increase is considerably less than the increased labor cost of harvesting the vegetables for the fresh market as compared with the same operation for quick frozen products. Furthermore, the labor of processing is much more efficiently accomplished in a plant than in institutions such as

TABLE I—Cost of Producing Peas for Fresh Market Vs. Quick Frozen

Crop	Fresh*	Frozen**
Man labor per acre.....	102 hr.	23 hr.
Total cost per acre.....	$82.31	$76.60
Yield, bu. or lb. per acre...	62 bu. (or 620 lb. edible)	1,965 lb.***
Cost per lb. edible.....	13.9¢	3.9¢

*N. J. Agricultural Experiment Station costs and returns from vegetables in central and southern New Jersey, 1930.
**N. J. Agricultural Experiment Station Preliminary Report, April, 1941.
***Average yield for 1939–40.

TABLE II — Percent of Vegetables Harvested For Freezing That Are Edible

Crop	% 1938	% 1939	% 1940	% 1941	% Average
Lima beans (Fordhooks)	..	..	24.84	39.58*	32.21
Green beans..	74	70	79	70	73.25
Spinach.....	64	58	67	71	65.00
Broccoli.....	28	29	27	39	30.80
Corn.....	22	21	20	23	21.50
Cauliflower...	30	30	32	28	30.00
Asparagus...	38	30	34	33	33.75

*Fordhooks—In 1941 we produced on our own farms with resulting better quality.

TABLE III—Steel Required To Pack 20,000,000 lb. of Vegetables Compared To That For Storing 20,000,000 lb. of Frozen Vegetables

Type of steel	Low-temperature storage*	Steel for canning**	No. 2 can	No. 10 can
Structural.....	600 tons	Tin (lb.)	87,600	48,460
Reinforcing.....	200 tons	Steel (lb.)	5,300,360	3,539,360
Piping & hangers..	170 tons			
Compressor & motor.....	10 tons			
Brine cooler & tanks.....	25 tons	Total (lb.)	5,387,960	3,587,820
Miscellaneous....	20 tons			
Total.....	1,025 tons		2,694 tons	1,794 tons

*Steel required to erect and equip low-temperature storage having capacity for twenty million pounds quick-frozen vegetables at Deerfield Packing Corp. in 1940.
**From American Can Co.

hospitals, restaurants, hotels and the Army.

Quick frozen vegetables lend themselves to the most economical packaging, as shown by Fig. 1. While the relative amount of packaging required for fresh, canned and frozen vegetables will vary somewhat for the particular vegetable in question, most vegetables adapted to all three methods of distribution are about 70 percent waste and 30 percent edible when shipped fresh. This large proportion of waste increases all distribution costs for the fresh product. This is the predominant reason for the high cost of vegetables shipped from distant producing areas to the consumer market.

Moreover, the transportation of large quantities of inedible product is an economic waste. With the nation at war, there is no transportation to be spared. The number of cars required for transportation, together with storage space requirements and the percentage gross weight edible, for fresh, canned and frozen peas is given in Fig. 2.

Vegetables harvested for quick freezing have a different proportion of edible product than those harvested and prepared for shipping fresh. For example, spinach harvested for shipment fresh includes roots. But on the other hand, broccoli harvested for freezing may have a smaller edible portion because some inedible parts would be trimmed off for shipment fresh. Table II shows the proportion of vegetables edible as harvested for the quick freezing operation at Deerfield. Many of these are very similar to vegetables shipped fresh. The proportion edible is large for vegetables such as green stringless beans but much less for vegetables such as corn.

Another factor in the vegetable distribution picture is the materials requirements for storing the produce. The major volume of highly perishable fresh vegetables is, of course, not stored. A few vegetables are held for a short time in cold storages at a temperature slightly above freezing. Canned vegetables, of course, are stored in tin coated steel containers and these again in paperboard shipping cases. But quick frozen vegetables are packed in paper cartons or bags, these in turn being packed in shipping cases similar to those for cans.

Low-temperature storage is ordinarily considered an expensive way of holding vegetables. However, if we measure the material requirements necessary to place vegetables in a tin can with those necessary to place them in a quick frozen pack and later in low-temperature storage, we obtain a measure of the efficiency and requirements of these two systems. The steel requirements for the construction of cold-storage warehouse capacity, as compared with the steel required for No. 2 and No. 10 cans for packing vegetables, are given in Table III and Fig. 3. A great saving is shown when the vegetables are quick frozen.

There is, naturally, an item of expense for maintaining cold tempera-

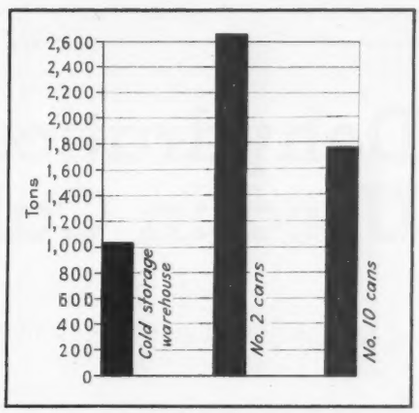


FIG. 3. Steel requirements for the construction of cold storage warehouse with capacity of 20,000,000 lb. (net) of vegetables as compared with the steel required for No. 2 and No. 10 cans to pack 20,000,000 lb. of vegetables.

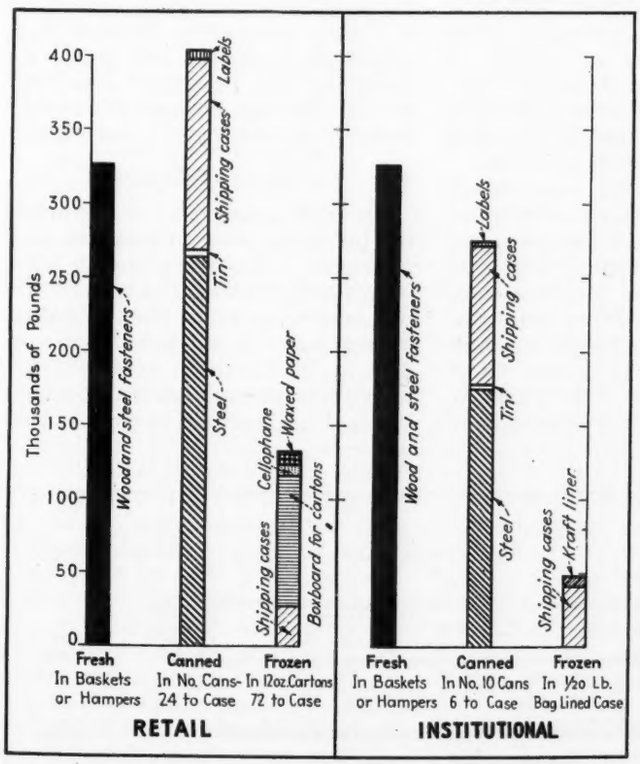


FIG. 1. Comparative package requirements for fresh, canned and quick frozen peas in both retail and institutional size packages, based on a quantity of 1,000,000 lb. The requirements are much less for the frozen product.

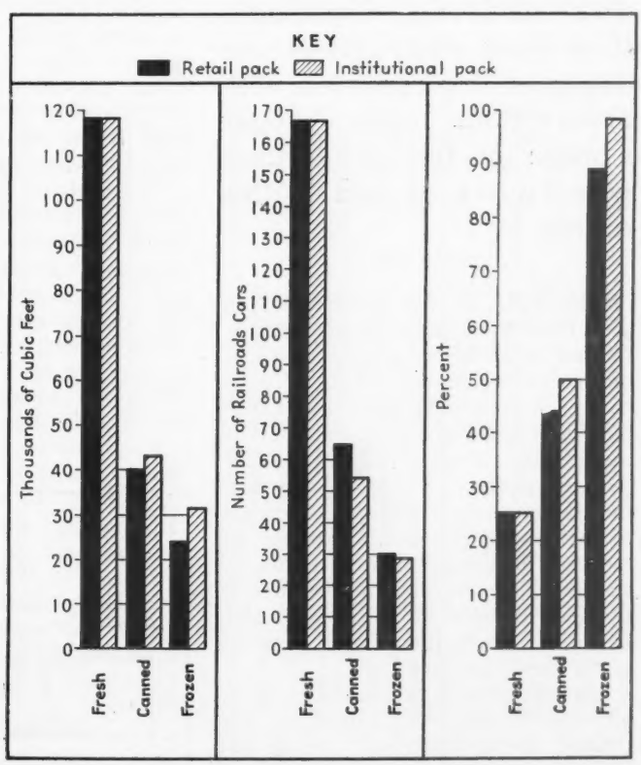


FIG. 2. Storage space requirements (left), transportation requirements (center) and percent of gross weight edible (right) for 1,000,000 lb. of fresh, canned and quick frozen peas in retail size packages and institutional size packages.

tures, this consisting of power for refrigeration, calcium chloride brine and ammonia. Brine and ammonia, however, need not be replaced after once being installed, unless there is loss by accident.

The storage requirements for canned vegetables would be in addition to the steel and tin used in the cans.

Still further waste must be considered in the actual distribution of fresh vegetables. The trade ordinarily computes the loss in shipping and marketing at 5 percent or more of all the vegetables handled, the figure being more or less dependent on the relative perishability of the product. But there is yet another and more significant loss, a loss too often not considered by the consumer. The more perishable products such as peas, beans, spinach, broccoli and asparagus lose a large portion of their vitamin and sugar contents when held at atmospheric temperatures during the warmer seasons of the year.

(*Turn to page* 108)

Dehydration Methods Used in California

By E. M. MRAK
University of California, Berkeley, Calif.

On the West Coast, dehydraters originally designed to handle prunes, raisins, apples and other fruits, are being widely employed in dehydrating vegetables. How these dehydraters are designed and operated, with observations upon proper storage of the dehydrated products, is told in this article.

ALTHOUGH the preservation of foods by drying is an old industry, the use of air blast recirculating dehydraters to accomplish drying is comparatively new. Modern dehydraters have been in use in California for hardly more than 20 years. In 1917, heavy rains during the prune sun-drying season caused enormous quantities of prunes to ferment and mold. Growers attempted to protect trays of prunes by stacking and covering, but because of the long duration of the rains, molding and fermentation even occurred under these conditions.

Experiences such as these have caused growers to seek safer procedures for drying. In Australia, rain damage has been reduced by the use of shade drying. In California, on the other hand, dehydration was adopted as a protection against rains. Other factors that have also stimulated the use of dehydration are improvement in quality, increased yields and release of sun-drying fields for other purpose. The quality factor cannot be overstressed. During sun-drying, fruits are exposed to insect infestation, contamination with dirt, microbial deterioration and oxidation. These are eliminated, or greatly reduced, when dehydration is used.

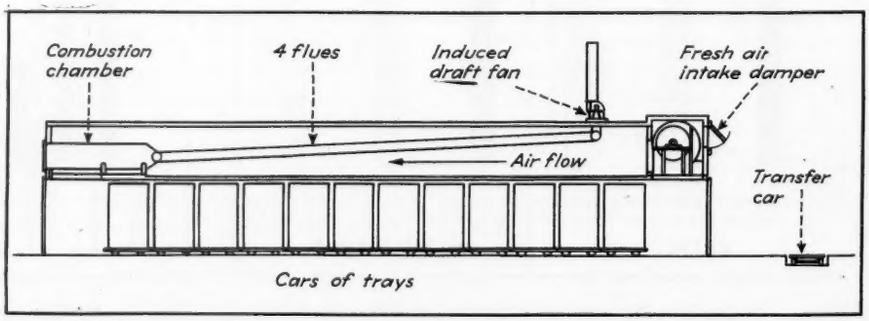
There are, on the other hand, several objections to the use of dehydration. Of all the fruits dried on a commercial scale, only prunes, apples, grapes for golden-bleached raisins, and cling stone peaches are acceptable to the trade when dehydrated. Apricots, freestone peaches, pears and nectarines, all of which are sulphured fruits, attain an unacceptable dull lemon yellow appearance when dehydrated. In all other respects, the dehydrated product is superior to the sun-dried. The desirable color can be obtained by exposing freshly sulphured fruit to the sun for three to six hours prior to dehydration. Recently, experiments conducted in collaboration with G. Mackinney and C. D. Fisher have shown that exposure to ultra-violet light prior to dehydration will also fix the color. Both of these procedures unfortunately are too expensive for commercial use. This might be a good time to introduce a series of new products termed dehydrated fruit. These products would stand on their own merits.

Improper operation from the standpoint of temperature, relative humidity or time of drying may result in reduced quality. Professor Moses of the University of California at Davis has recently shown that prunes dried at 175 or 180 deg. F. are definitely inferior to those dried at 165 deg. F. The higher temperature resulted in a perceptible scorched taste and a darkened flesh. Some growers use high drying temperatures in order to increase production but, in doing so, sacrifice quality.

Most of the dehydraters that may be used for war time production are located on the West Coast. These, of course, are ordinarily used about three months of each year for the dehydration of prunes and grapes. Most of these plants are small and not capable of producing over 50 tons of dried fruit per day, although there are several with capacities greater than 50 tons per day.

Types of Dryers

There are several types of fruit dryers, but the tunnel dehydraters are the most satisfactory. Hop evaporators or batch walnut dehydraters are not suited for use in drying fruits and vegetables. Natural draft evaporators, however, were used quite extensively during the last war. Today they are used only for hops and apples. These dryers are constructed



Section through a tunnel dehydrater of the counter-current, recirculating air blast type, with heating by direct radiation.

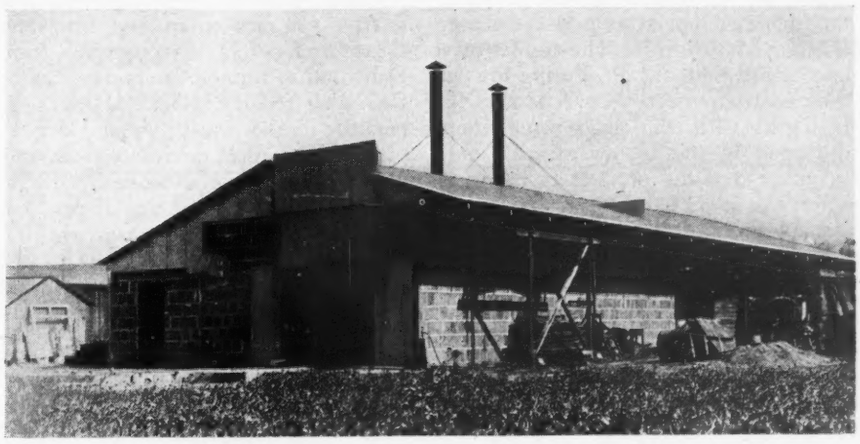
* Based on a paper presented at the "Symposium on Dehydration" held by the American Institute of Nutrition in Boston, Mass., on April 1, 1942.

as kilns with slate-floored drying rooms located over a heater. Apples or hops are spread on the floor in a layer about two feet deep. Hot air passes through the pieces and leaves the drying chamber through the roof vent. Sometimes fans are installed in the roof vents to increase the movement of air through the drying material. These plants are slow, inefficient and lack control.

Cabinet evaporators operate on the same principle as hop dryers, but differ in that stacks of screen-bottomed trays, rather than a thick layer of fruit, are placed over the heater. These are seldom used any more, although they offer the advantage of permitting the use of different temperatures in different cabinets.

Draper or belt dryers have been used to some extent for reconditioning dried fruits, a procedure requiring the removal of relatively small amounts of moisture. One of these dryers, located in California, is being converted into a vegetable dehydrater. It is doubtful if the draper dryer will prove as satisfactory as the tunnel dehydraters being used for the dehydration of vegetables.

The great increase in the use of dehydraters for the drying of fruits in California followed the introduction and development of forced draft tunnel type dryers. These have proven to be most satisfactory for fruits and vegetables. Although forced draft and recirculation are now used in most tunnel dehydraters, the methods of heating air and conducting its flow through the dryer vary considerably with the units manufactured by different concerns.



Exterior of a cross-flow tunnel dehydrater in use in California.

Exterior of a tunnel type dehydrater used in the drying of California fruits.

Methods of Heating

Air to be passed over the fruit may be heated by direct heat, direct radiation or indirect radiation. By direct heat is meant the addition of heat units to the air used in drying by direct mixing of the products of combustion and the air, without the intervention of furnace walls or flues. This can only be done where there are no combustion products that might damage the fruit or vegetable. This heating system is particularly well adapted to the use of natural gas as a fuel. Oils are frequently used, but a careless operator may easily damage the fruit by smudging. Coal or wood cannot be used. The advantages of direct heat are high fuel efficiency, low cost of installation and upkeep, and instantaneous temperature regulation because of the absence of stored heat in flues. The disadvantages are possible contamination of the food by products of incomplete combustion and the necessity of using a high-grade fuel.

Direct radiation as used in dehydration refers to the absorption of heat by air from burning fuel by direct radiation through the furnace wall, flues or radiators. This system offers the advantages of freedom from contamination with combustion products even though a poor grade of fuel is used. Disadvantages are expense of installation and upkeep, lack of instantaneous temperature regulation because of heat storage, and lower fuel efficiency resulting from stack losses.

Indirect radiation, or the generation of heat at a distant point and its transportation to a point at which air is to be heated, by means of steam or hot water radiators, is rarely used any longer. The advantages of such a system are automatic regulation, no limitation of the type of fuel that may be used and the distribution of radiators where desired. The disadvantages of indirect radiation are expense of installation and upkeep, and low fuel efficiency.

Temperatures Used

The dehydration temperature used varies with the "critical temperature" of the product being dried; that is, the temperature above which heat damage may occur. The critical temperatures of most products range between 110 deg. F. (walnuts) and 165 deg. F. (prunes). Most other fruits and vegetables fall within this range.

Air Flow

The systems of air flow are classified as counter current, parallel current and reversed current. The counter current and reversed systems are in most common use, but the parallel current has been used to some extent for rapidly drying products such as apples and certain vegetables.

When the counter current system is used, air and fruit move in opposite directions through the drying tunnel. Fruit enters at the cool end and leaves at the hot end of the tunnel. By moving the fruit from the cool end to the hot end of the tunnel gradually, the rate of drying is not so rapid that undesirable color and flavor changes are likely to occur. This system also favors the maximum use of heated air in the long chamber and hence maximum power and fuel efficiency.

In the reversed system of air move-

ment, the air flow is so arranged that the highest temperature is at the center of the drying tunnel. The tunnel may be straight, with the air flowing toward the end from the center; or it may be U-shaped with the air flowing from the bend in the U toward each end. In either case the product to be dried enters at a lower temperature and moves toward the hotter air at the center, reaching it after about half of the drying is accomplished. Then the fruit moves past the center and finishes drying at the second cool end of the tunnel. This system is more difficult to control than the more simple counter current system. There are also variations of the reversed system in which air moves across the trays, changing direction periodically with movement of the trucks.

When the parallel current system of air flow is used, the product to be dried enters at the hot end of the tunnel and moves in the same direction as the air flow. This system seems satisfactory theoretically from the standpoint of rapid removal of water and critical temperature, but is unsatisfactory from the practical standpoint of evaporation of water from most fruits. Water is most easily evaporated from fresh fruit and with greater difficulty when it is nearly dry. A high initial temperature often causes bleeding or exudation of juice from the fruit with a resulting loss in yield. This of course would not happen to apples or vegetables. Recent investigations in Canada indicate that the parallel current at the start and counter current at the finish is very satisfactory for drying apples because of the rapidity with which they give up moisture. This may also be true of some vegetables.

In most dehydraters, air is drawn from the heating chamber and forced through the drying chamber under pressure. This gives more positive air distribution and better temperature control than if air is drawn through the drying chamber. A good air flow is necessary and should not be less than 500 linear feet per minute.

The volume of air has no effect on quality, but uniformity of distribution may be important in obtaining uniform drying. The rate of air flow, however, is very important from the standpoint of dehydrater capacity. Within certain limits, more rapid air flow induces faster drying, and hence greater capacity and less cost per ton for power, fuel and labor. If the length of drying tunnel is increased, the velocity of the air flow should also be increased so that the temperature drop and humidity increase will not be so great as to prevent drying at the cold end. The temperature drop is dependent on the relative volumes of air and fruit and the rate of evaporation from the fruit. Dehydration tunnels for prunes can be 50 or 60 feet long because the temperature drop is usually about ½ deg. F. per foot, but apple dehydraters can only be about half as long because the temperature drop is about 1 deg. F. per foot.

Case Hardening

It is usually customary to circulate as much air as possible to obtain maximum fuel efficiency. However, sometimes during the rush season it is minimized to reduce the drying time. This practice has caused some losses resulting from "case hardening" and ultimate microbiological and chemical deterioration. Case hardening is a condition in which the outer layer of cells gives up its moisture more rapidly than the inner cells. The result is a layer of desiccated cells on or near the surface which retard the outward movement of the moisture during drying. In order to prevent case hardening the relative humidity of the air must be adjusted in accordance with the rate at which the tissues give up their water. The diffusion of moisture out of fruit varies with variety, maturity, size, season and general condition of the fruit. In 1937, a considerable tonnage of prunes was case hardened because of improper dehydrater operation. During subsequent storage in bins, the moisture diffused slowly from the interior of the fruit through the case hardened layer. Eventually the surface moisture of the fruit was sufficient to support yeast and mold growth. In fruit dehydraters the relative humidity at the hot end of the tunnel usually ranges between 15 and 30 percent. High humidities may cause discoloration or loss of SO_2 if the product is sulphured. For example, pimentos turn dark rather than remain red and the flesh of prunes turns brown rather than light amber. Golden-bleached raisins lose much of their SO_2 more rapidly if the relative humidity is maintained above 35 percent.

Storage of Dehydrated Products

It is commonly assumed by brokers, retailers and consumers that because a food is dehydrated it cannot undergo deterioration. This, of course, is a fallacy. The deterioration of dried fruits and vegetables in storage is a problem of considerable importance and may result in undesirable changes in appearance, taste and food value. In the past, much of the storage deterioration was either overlooked or taken for granted as changes expected to occur. In fact, handlers of dried fruits still fail to realize that certain changes occurring during storage may be manifestations of incipient deterioration rather than of storage maturation.

There are several types of deterioration, the importance of which vary with the particular food and conditions of storage. The most common types of deterioration are insect infestation, enzymatic and oxidative changes, souring, fermentation and molding.

Insect damage is a problem of great importance to all dried food industries since it may occur in the field, packing house, during shipment or on the grocer's shelves. Insect infestation can be prevented by the use of effective fumigants such as methyl bromide, packing in insect proof containers, and storing in cold storage. Some of the dried fruit insects can withstand common cold storage temperatures for considerable periods of time, although their activity is retarded.

The darkening of dried fruits is a type of deterioration of importance since it is usually accompanied by undesirable changes in appearance and taste as well as loss in vitamins, particularly A and C. This type of spoilage occurs most commonly in sulphured cut fruits such as apricots and peaches. It can be prevented by use of proper sulphuring procedures, drying to a lower moisture content or storing at lower temperatures. It can be retarded but not prevented by storage in an atmosphere of nitrogen.

Microbiological Deterioration

Enzyme activity occurs in dried vegetables if the enzymes have not been inactivated. It results in undesirable changes in appearance, taste, odor, and nutritive value.

Microbiological deterioration occurs if the products are not sufficiently dry when stored, or if they absorb moisture during storage. Fermentation sometimes occurs in dried fruits even when properly cured. The sugar content of fruits varies with the year, although drying is always carried to about the same moisture level. Furthermore, sugar tolerant yeasts capable of growing in sirup containing over 65 percent sugar can nearly always be isolated from the unsulphured dried fruits. The changes caused by these yeasts occur very slowly but are easily detectable by odor, taste, and appearance of the flesh. Microbial deterioration can be avoided by the use of dehydration rather than sun-drying, reducing the moisture content, and storing at lower temperatures.

In general, all types of storage deterioration can be reduced or eliminated by use of proper pretreatments, drying to a low moisture content, using good packages and storing at cool temperatures.

Select Floor Materials To Suit Plant Needs

By RICHARD KANEGSBERG
Kayel Engineering Co., Newark, N. J.

PART II—There is a suitable floor material for every service requirement. By thorough analysis of each individual flooring problem, the proper materials can be selected and applied*

THERE are a number of contractors in the field who specialize in the construction of really serviceable floors and who will guarantee their work. Such details as the proper proportioning of aggregates, water-cement ratio, placing technic, machine compacting, finishing treatments and hardening are matters for expert handling if the end result to to be a really resistant floor.

The research chemists have not been neglecting the problems and possibilities of concrete floors, and recent developments have brought forth a host of new and useful treatments to make concrete more resistant and more durable for many purposes. There are new methods of waterproofing, of hardening, of making concrete more resistant to certain chemical salts, of "case-hardening" the surface, of sealing concrete surfaces, of curing concrete; but all of these must be applied with understanding and under close supervision.

In former years, a concrete job could be given to the average mason contractor with a reasonable assurance that he could turn out a finished job, up to par with the best practice. But today, with the increased demands placed on floor performance, with greatly increased trucking loads, and with new standards of safety inspections, it is necessary to have floors much more resistant than before. It is possible to have these floors, but the old rule-of-thumb methods are out—the right formula and technic must be carefully selected, and then the floor must be built according to that formula without deviation and with no condoning of carelessness.

All concrete floors exposed to temperature variations or to flexing of the supporting structure must have reinforcing steel in the form of welded wire mesh or of expanded steel mesh. Flexing may be caused by heavy rolling loads, concentrated standing loads, expansion or contraction, or in general, all forces either internal or external, which impose bending stresses on the material. There are numerous non-technical pamphlets available to assist the plant manager in specifying the proper materials and reinforcing of concrete floors to meet his requirements of weight, load, service and cost, but no amount of information will substitute for trained supervision in the installation of these materials.

Ceramic Tile Mosaic

Based on a proper foundation of concrete or wood, with appropriate hard fill and bedding material, ceramic tile mosaic in any of its numerous forms is a useful, beautiful and serviceable floor for light service, particularly where a bright clean appearance is wanted and where the surface is frequently washed. Tile setters and contractors skilled in this material can usually turn out a workmanlike job, but it is important that the foundation material be carefully selected and placed. The surface material has no structural strength and must depend on the foundation for its complete support. Flexing or settlement of the foundation material means that unsightly cracks and a loose surface will result, and this is very difficult to repair.

Terrazzo

A light service flooring of very attractive appearance and considerable resistance to water abrasion is terrazzo.

Concrete floor during installation. Note roughness of base slab and stiffness of concrete mix being spread with shovel and rake. The concrete is then tamped and screeded, followed by floating with mechanical floats. These operations are followed by troweling and curing.

* Part I of this article appeared in Food Industries for July, 1942, page 57.

This flooring has a base of portland cement concrete, the topping being composed of portland cement, fine sand and marble chips, which are allowed to set hard and then ground by machine and polished. The resulting surface is very smooth, quite hard, and is colorful because of the comparatively large area of marble chips exposed by the grinding operation. A terrazzo floor is usually divided into small areas by brass strips, to minimize cracking. Here again the foundation is all important in determining the useful life of the floor, because the surface strength is negligible and the foundation must supply rigidity and resistance to flexing.

Quarry Tile

Many types, shapes, colors, sizes and thicknesses of quarry tiles are available for diversified purposes. The material is suitable for light and medium service according to type, some tile being more resistant to abrasion than others. The hardest and densest tile is known as "flint" and may be obtained in a large variety of surfaces and colors. The tiles are set in a bed of portland cement mortar about 1 in. thick, placed over a foundation of concrete, preferably reinforced if supported by a wood structure. Tiles are laid with open joints, which are later filled with a rich cement-sand mixture. Quarry tile is more resistant to abrasion than concrete but is brittle and subject to cracking if not properly supported.

Vitrified Tile and Brick

Paving tile and brick are among the hardest and toughest of the materials available for floorings, and may be used for every class of service. The best types are made of shale and are deaerated for greatest density and non-absorptive qualities. Included in this class is the so-called "packing-house tile," a vitrified tile with a glazed surface. There are a number of thicknesses, colors and shapes made especially for floor use, and many shapes are made with scored surfaces for bonding to various types of cements as well as to make the surfaces slip-proof.

Installation is usually made over a concrete foundation and the tile or brick are bedded in a cement mortar or asphalt. Joints may be filled with rich cement grout or with asphalt. Experience has proved that the narrow joints are far more durable than wide joints, as the jointing mixture is usually softer than the tile or brick and may wear slightly under heavy traffic. Wide joints in this condition will allow truck wheels to wear down the edges of the bricks to meet the depressed joint, but this is not likely to happen if the joints are kept as narrow as possible during construction. The composition of the jointing compound is most important, and there are various mixtures recommended for this service utilizing portland cement, fine sand and any of a wide selection of water-proofing compounds. The main purpose of these mixtures is to obtain maximum density and high adhesive qualities.

Metal Floors

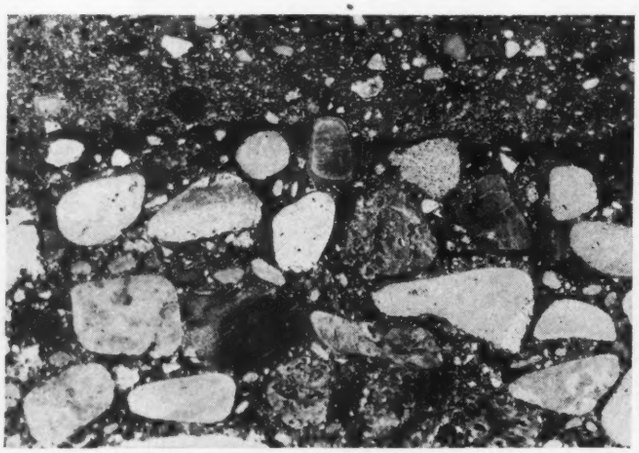
Several kinds of cast iron and steel floorings are on the market for light-, medium- and heavy-service applications. Steel plates may be used if it is possible to anchor them securely against the buckling induced by rolling wheels of trucks. Only welding or bolting to steel frame supports will keep steel plates from pulling up at the edges under these conditions. Cast iron tiles may be embedded in mortar beds in the same manner as ceramic materials, but since the metal tiles have metal anchors cast in the underside, the tiles may be laid up with very close joints. For heavy-duty service, cast-iron grids or steel gratings are available for insertion into concrete beds, the openings of the grids being filled in with rich cement mortar or asphalt mastic. Priority restrictions will possibly interfere with the production of these forms of flooring protection, particularly the various types manufactured from steel shapes.

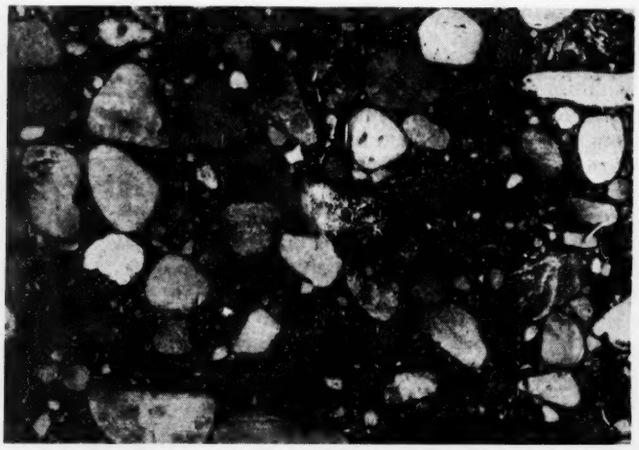
Natural Stone

In some locations, natural stone may be obtained for flooring purposes. If correctly used, it will prove to be extremely durable and useful for the most severe services. Such stone as slate and granite, found in many parts of the country, is easily installed, and local limstones or marble may be used to advantage. Large slate and "bluestone" slabs are usually set in beds of moist cement and sand, and the joints are filled with cement mortar or asphalt. Granite in block form set in similar fashion with the joints grouted with cement makes one of the most resistant floorings. Although they are somewhat expensive, such floors are low-cost in the long run because their useful life is so long.

Ramps

The use of ramps for passage from one level to another is on the increase in plant design, but the satisfactory flooring of these pitched floors is a real problem because of the fact that traffic is usually concentrated in lanes and the heaviest loads go downhill. Ordinary





Difference between properly and improperly constructed concrete floors is readily apparent by cutting sections through them. RIGHT—Correctly proportioned wearing course shows uniform distribution of coarse aggregate through the entire depth of finish and right up to the wearing surface. LEFT—This section reveals a layer of weak material at the wearing surface, resulting from over-troweling, which caused the finest particles and the water to rise to the top. The surface skin thus formed has little strength and shrinks badly, causing crazing, followed by dusting and disintegration under traffic.

LEFT: In producing an even concrete floor finish, a long float will remove the inequalities left by a short float and produce an even, plane finish. Note the absence of water at the surface. RIGHT: Hand floating and troweling in concrete floor finishing are among the finishing operations that play an important part in determining the appearance and durability of the wearing surface. Floating may be done by hand or by mechanical floats. Troweling further compacts the wearing surface of the concrete floor and produces the smooth surface which is necessary for efficient trucking operations.

concrete surfacing is likely to rut and wear badly in this application and sheet surface coatings may creep or buckle. A solution of the problem, if the traffic is very heavy, is to install cast iron or steel grids filled with concrete or mastic. Lighter service may be handled by the proper installation of asphalt tile for industrial service, but particular care must be taken to see that the foundation is properly prepared and that a satisfactory bond is obtained between the tile and the foundation.

Elevators

Perhaps the hardest service in the plant falls on the floors of elevators. Here the wear is concentrated, truck wheels are twisted, loads are dropped, and all sorts of abrasive materials are carried in and help to break up the flooring. Yet, too heavy a material may not be used because of the weight limitations of the carrier. Hardwood flooring is usually effective in such locations, but only if it is rigidly maintained in good condition and if damaged sections are quickly replaced. Quick and effective maintenance service may be secured if the wood surface is protected by a wearing surface of hard asphalt tile. Local damage to the tile may be easily repaired without putting the car out of service for more than a few minutes.

A Floor for Every Service

In the limited scope of this article, it has been possible to mention only the most outstanding types of materials for floorings and, necessarily, many very meritorious products must escape detailed description. But the main point of consideration should be remembered—that there is a right flooring for every service, and it is only through close analysis that the proper materials may be selected and applied.

To produce a coarse grained surface, after the surface has been troweled, brush it lightly in one direction with a hair broom to produce small grooves. For areas subject to heavy duty, a coarse grained finish that serves better is obtained by the use of non-slip aggregates embedded in the surface.

Properly constructed concrete floor in warehouse resists wear and tear of heavy trucking for many years.

With such a great variety of selections possible, prejudices must be forgotten and, instead, the physical properties of materials must be closely studied to fit the floor to the job. Then if competent labor and supervision is employed for the installation, the bogey of "headache floors" should pass into limbo.

More Coming

Chemical attack upon floors and the resistance of various flooring materials to such attack complicates the problem of floor selection. This will be considered in a later article on food plant floors.

How to Maintain Electric Motors

By O. F. VEA
Motor Division, General Electric Co.,
Schenectady, N. Y.

Practical pointers on the proper care of motors. These suggestions will help you to keep your power units rolling and avoid any slump in the part your plant plays in the production - for - victory program

PRESENT-DAY conditions make it necessary that all electric motors be babied. To insure efficient motor operation, inspection and servicing should be systematic. An inspection schedule must be elastic and adapted to the needs of each plant, but the following schedule, covering both a.c. and d.c. motors, is based on average conditions in so far as duty and dirt are concerned:

Every Week

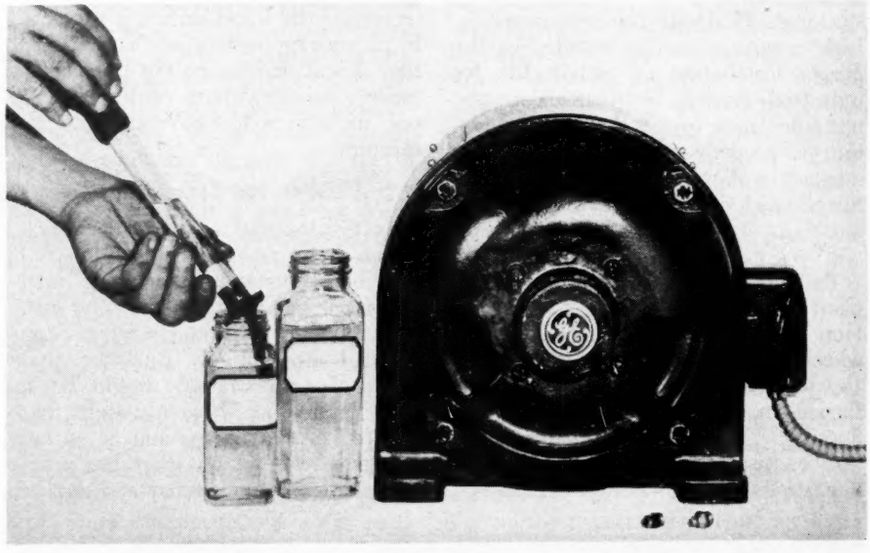
1. Examine commutator and brushes.
2. Check oil level in bearings.
3. See that oil rings turn with shaft.
4. See that shaft is free of oil and grease from bearings.
5. Examine starter, switch, fuses and other controls.
6. Start motor and see that it is brought up to speed in normal time.

Every Six Months

1. Clean motor thoroughly—blow out dirt from windings and wipe commutator and brushes.
2. Inspect commutator clamping ring.
3. Check brushes and renew any that are more than half worn.
4. Examine brush holders and clean them if dirty. Make sure that brushes ride free in the holders.
5. Check brush pressure.
6. Check brush position.
7. Drain, wash out and renew oil in sleeve bearings.
8. Check grease in ball or roller bearings.
9. Check operating speed or speeds.
10. See that end play of shaft is normal.
11. Inspect and tighten connections on motor and control.
12. Check current input and compare with normal.
13. Run motor and examine drive critically for smooth running, absence of vibration and worn gears, chains or belts.
14. Check motor foot bolts, end-shield bolts, pulley, coupling, gear and journal setscrews, and keys.
15. See that all motor covers, belt and gear guards are in good order, in place, and securely fastened.

Once a Year

1. Clean out and renew grease in ball or roller bearing housings.



Thorough cleaning of ball-bearing housings at periodic intervals is beneficial in obtaining a long bearing life. The housing of this motor can be flushed with a grease solvent without disassembling the motor. The solvent is flushed out with a light oil before putting in new grease.

2. Test insulation by megger.
3. Check air gap.
4. Clean out magnetic dirt that may be hanging on poles.
5. Check clearance between shaft and journal boxes of sleeve-bearing motors, to prevent operation with worn bearings.
6. Clean out undercut slots in commutator.
7. Examine connections of commutator and armature coils.
8. Inspect armature bands.

Records

The competent maintenance man will have a record card for every motor in the plant. All repair work, with its cost, and every inspection can be entered on the record. In this way, excessive amounts of attention or expense will show up and the causes can be determined and corrected.

Inspection records will also serve as a guide to tell when motors should be replaced because of the high cost of keeping them in operating condition. Misapplications, poor drive engineering and the like will also be disclosed.

Lubrication

One of the major features of a maintenance program, from the standpoint of effect upon the general performance of a motor, is proper lubrication. And it is very important that no dirt is allowed to get into bearings during the lubricating operation. Likewise, care must be taken to avoid an excess of lubricant which can be carried into the windings to catch dirt and hasten failure.

Most fractional-horsepower motors built today require lubrication about once a year. But small fan and agitator motors will often require more frequent lubrication, with three-month intervals between oilings.

Drying Windings

The most effective method of drying out motors that have become wet by accident or because of "sweating" is to pass current through the windings, using a voltage low enough to be safe for the winding in its moist condition. Thermometers should be placed on the windings to see that they are heated uniformly and are not overheated.

(*Turn to page* 108)

Wartime Changes In Metal Containers*

By R. H. LUECK

Director of Research, American Can Co., Maywood, Ill.

Nowhere will you find a more thorough discussion of the steps being taken to conserve tin in metal food containers, nor a more accurate analysis of what the changes mean to the food processor. This article will help you to understand what lies ahead

HOW is tin conservation being accomplished? In 1940 the can-making industry cut up approximately 50,000,000 base boxes of plate requiring 29,900 long tons of tin. Had no shortages been created, it was estimated that 1942 would have witnessed a plate consumption of 67,500,000 base boxes for cans alone, and to cover this some 41,000 tons of tin would have been required on the standard basis of 1.5 lb. per base box—a far cry from the more than (censored) ton tin average which appears necessary.

The first steps in conservation were at once the most obvious and least painful—reduction in the weight of tin coating from 1.5 lb. to 1.25 lb. per base box (pot-yield basis) for all but the most corrosive items packed in tin plate. Research had proved that, with the low metalloid types of sheet steel available since the advent of the cold reduction process, such decrease in weight of tin coating would not impair inordinately the service value of the can. But, such a 16.6 percent saving would bring the total down to only 34,200 tons, which is not enough.

Those in Washington charged with the conservation of vital materials visualized the need for a more drastic reduction; also a showing of results more immediate than could be attained by the time-consuming process of gearing steel mills, can factories and canneries to the production and use of substitute materials. The net result was WPB Orders M-81 and M-86-a—drastic, ruthless, painful, but admittedly effective. Overnight a contemplated annual requirement of 67,500,000 base boxes of tin and terne plate was reduced to 39,600,000 base boxes by curtailment in the number and volume of products for which tin plate containers were permitted. This includes only tin plate required for items permitted under the tin orders M-81 and M-86-a. Tin required for Lease-Lend deliveries of tin plate and for Army and Navy nonfood items was separately allocated. A probable annual tin consumption of 34,200 tons (on the pot-yield basis of 1.25 lb. per BB) was thereby immediately reduced to 21,500 tons. Three considerations were dominant in the preparation of the Order M-81.

1. Complete or partial elimination of many items, depending upon the degree of essentiality in the population's requirements, a consideration obviously subject to individual opinion.

2. Elimination of manufactured or processed products which normally had been obtainable at all seasons outside of cans (coffee, tennis balls, oil, etc.) and also those for which the basic ingredients could be obtained in bulk and preparation completed in the home (beans, spaghetti, shoestring potatoes, etc.).

3. Elimination of all sizes below the No. 2 can except in certain cases where a smaller size has always been most widely used.

FOREWORD

For the first time since the war began this publication has run into problems of censorship. The Code of Censorship prohibits the publication of estimates, whether accurate or not, of amounts of critical or strategic materials on hand or available unless these figures have been previously released by approved government sources.

Mr. Lueck's masterly analysis of the tin situation, including 2,000 words of text, would, if published here, be riddled with the word "censored" in place of figures. This destroys its value; hence his analysis of the tin situation is not published. Sorry!

What is published is the description of the methods of conserving tin and a statement of how the metal container situation is developing.—THE EDITORS.

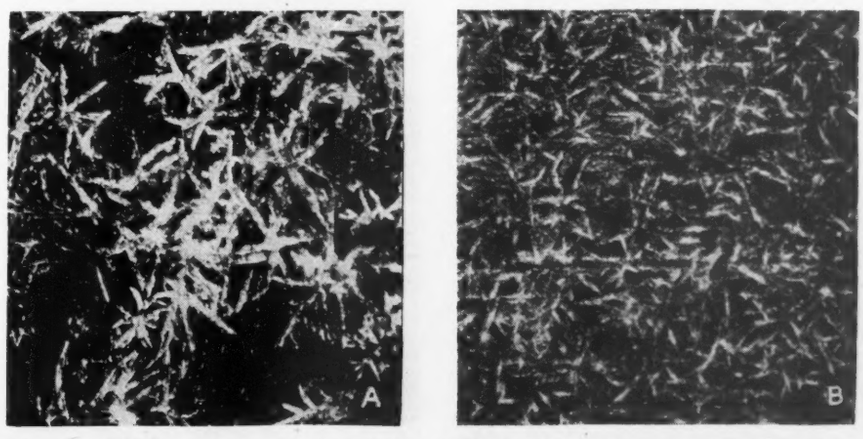


FIG. 1. Crystal formation on surface of bonderized steel. (A) Thin, nonuniform formation. (B) Normal formation.

* Based on a paper, "Metal Container Changes in the Interest of Tin Conservation," presented at Minneapolis meeting of Institute of Food Technologists. Because of the current importance of the subject, this paper has been released by the Council of IFT to the author for immediate publication.

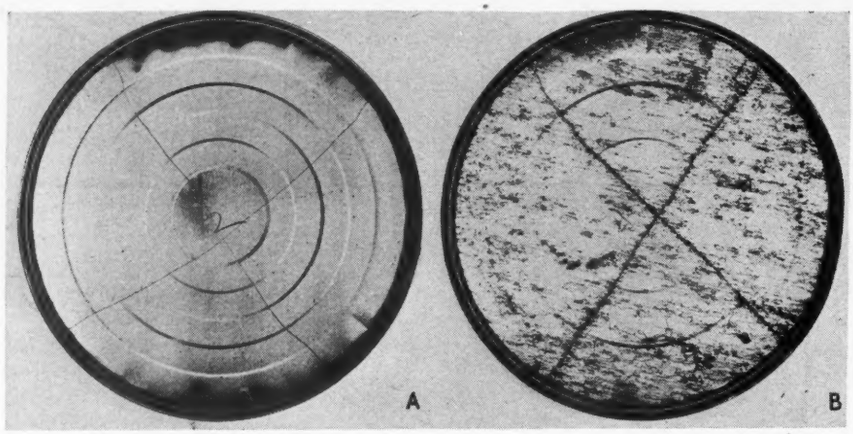


FIG. 2. Underfilm corrosion beneath organic coating: (A) Bonderized steel. (B) Untreated deoxidized steel.

Quality considerations were subjugated; a depreciation in quality of certain items because they were to be no longer obtainable in hermetic containers was considered of little significance under the stress of wartime conservation. Out went many an item familiar in every American city and village, canned beer, canned oil, canned dog food, and perhaps most painful of all, canned beans.

So we came down to an annual tin requirement of 21,500 tons—still above the average called for in a projected five-year plan of tin supply and consumption. Moreover, the 21,500-ton figure will not be met in 1942 because the M-81 Order did not become effective until February 11, and there was an unusual consumption of tin plate prior to that date—a situation to be expected with the threat of a restricting order hanging over the heads of can users.

The further necessary restriction in the use of tin can be accomplished by either of two methods, a further ruthless and painful curtailment in volume, or the use of substitute materials in the container. Fortunately, research and development during recent years, anticipatory of the present world involvement, has made the latter possible. Among the many metallic substitutes investigated, including silver, nickel, chromium, aluminum, and combinations thereof with zinc or tin, two have emerged which, together, should enable the canners of essential foods to survive and feed the armies of our nation with the types of food to which they have long been accustomed, armies so far afield that subsistence on fresh or frozen foods is out of the question. These are electrolytic tin plate, carrying one-third or less of the weight of the tin coating common to the conventional hot-dipped tin plate, and chemically treated (bonderized) steel which carries no tin whatsoever.

Tin Plate Substitutes

Substitution in the metal container must necessarily follow a step-wise procedure; a process of evolution, as it were. While the experimental background already has been laid, steel mills must erect and bring into operation entirely new equipment for the manufacture of both bonderized steel and electrolytic tin plate. Twelve months or more will be required to reach required capacity for the production of substitute plates.

In the meantime, the can manufacturer is not remaining idle. Additional organic coating equipment is being built, existing machinery is being modified and new units are being constructed to employ the new soldering technics required with bonderized steel. Factory personnel is being trained in the new operations. Concomitantly, organic coating specialists, metallurgists and packing technologists are engaging in an intensive experimental program to determine with exactitude to just what extent substitution can be effected.

Substitution of the metal container is something to be approached with caution. How will it influence the service life of the can as well as the hermetic properties? Will it affect the color and flavor of the contents? The exploratory work completed to date has pointed the way and indicated the objectives. The immediate job of technologists is to determine for every canned item to just what extent those objectives can be attained or exceeded. As substitute plates become available the can maker will employ them—first in cans for those products which present the least corrosion hazard, and in the least critical parts of the can. As greater quantities are made available by the steel mills, use of the substitutes will be extended to all parts of the can and to all those products where the experimental program now under way confirms the observations of the exploratory program already completed. Table IV shows a progressive program of tin conservation visualized by the can manufacturers to utilize the substitute plates as they become available, and as equipment for handling them is brought into operation. All calculations are based on an annual consumption of 39,600,000 base boxes of plate, which is the estimated amount that will be required in 1942 for the domestic manufacture of cans permitted in Orders M-81 and M-86-a.

It appears that the can manufacturers cannot only meet the average consumption requirement for the five-year period, but are in a position to better it, the extent depending upon the speed with which substitution can be effected. Here it is pertinent to note that, whereas the volume restrictions imposed by the can order effect a saving of about 12,700 tons of tin with no electrolytic tin plate or bonderized steel being used, they will net a

TABLE I—World Mine Production of Tin (1940).[1]

	Long tons
Malay States and Straits Settlements	85,384
Netherlands East Indies	44,447
Bolivia	37,940
Thailand	17,447
Nigeria	10,257
Belgian Congo	12,392
China	6,349
Burma	5,500
United Kingdom	1,800
Argentina	1,600
French Indo-China	1,560
Other countries	10,078
Total	234,754

TABLE II—Long Tons of Tin Used in 1937.[2]

Use	Primary	Secondary	Total	Percent
Tin plate	39,221	.....	39,221	45
Terne plate	382	1,015	1,397	
Solder	12,026	7,832	19,858	22
Babbitt	4,501	2,272	6,773	7.5
Bronze	3,712	2,784	6,496	7.0
Tinning (wire, milk, vessels, etc.)	2,585	67	2,652	....
Solid tin tubing	1,278	18	1,296	....
Collapsible tubes	3,571	.....	3,571	5.5
Foil	1,456	4	1,460	
Type metals	221	1,140	1,361	
Chemicals	171	1,331	1,502	
Tin oxide	793	411	1,204	
Galvanizing	997	.....	997	
Bar tin (chiefly for job tinning and soldering)	652	174	826	
Pewter	374	33	401	
Miscellaneous alloys	482	24	506	
Other miscellaneous uses	506	97	603	
	72,928	17,202	90,130	

TABLE III—U. S. Consumption of Primary Tin.[3]

Year	Total (tons)	Tin plate (tons tin)	Percent of total
1937[2]	72,928	39,221	53.8
1938	50,624	24,314	48.4
1939	69,041	38,321	55.5
1940	74,114	38,964	52.5
1941	100,420	47,849	47.6
		Average	51.4

saving of not more than 1,500 tons when the projected substitution is completed. It is to be hoped, therefore, that as substitution proceeds the WPB will see fit to relax somewhat on the volume restrictions with respect to cans, the steel situation permitting.

Bonderized Steel

The use of bonderized steel in can manufacture represents the all-out in tin conservation but places the greatest burden on the can manufacturer in that it involves the use of new manufacturing technics and much additional equipment.

The bonderizing process is not new, having been employed in one form by the automobile makers for several years with great success. In simplest terms it consists in treatment of the steel surface with a solution of zinc dihydrogen phosphate containing an oxidizing agent and a catalyst. The patents covering it are owned by the Parker Rustproof Co. of Detroit. Properly treated, the steel surface is left with a fine-grained adherent coating of mixed crystals of zinc and ferric phosphates. Figure 1 illustrates the crystal formation, 1B representing a suitable deposit in contrast to that in 1A which is thin, uneven, and but partially effective. As practiced in the automobile industry, the bonderizing process is relatively slow and not adaptable to can manufacture since the treatment must be applied after fabrication of the metal. The "K Bonderite" process, a modification developed by the Parker company in cooperation with certain elements in the can making and steel industries, produces a coating suitable for fabrication after treatment. Moreover, it is rapid, the time required for treatment being a matter of a few seconds, and thereby compatible with sheet steel manufacture.

TABLE IV—Progressive Conservation of Tin Projected by Can Manufacturing Industry

Stage No.	Type of substitution	1.50-lb. hot-dipped tin plate, (base boxes)	1.25-lb. hot-dipped tin plate, (base boxes)	0.5-lb. electrolytic tin plate, (base boxes)	Bonderized steel, (base boxes)	Spec. mfg. terne plate, (base boxes)	Tin required, (long tons)
(Assuming that 1.25-lb. hot-dipped tin plate is continued in the manufacture of vent-hole milk cans)							
1	None	1,047,400	36,843,200	.....	47,400	1,682,200	21,450
2	Electrolytic and bonderized steel in can ends where possible	1,047,400	26,265,100	6,471,500	4,809,900	1,026,200	16,919
3	Bonderized plate in can ends and electrolytic plate in both bodies and ends where possible	1,047,400	13,659,700	19,076,900	4,809,900	1,026,200	12,698
4	Bonderized and electrolytic plate in both bodies and ends where possible	1,047,400	13,659,700	13,432,600	11,345,300	135,000	11,338
(Assuming that 0.5-lb. electrolytic tin plate is used in the manufacture of vent-hole milk cans in stages 3 and 4							
1	None	1,047,400	36,843,200	.....	47,400	1,682,200	21,450
2	Electrolytic and bonderized steel in can ends where possible	1,047,400	26,265,100	6,471,500	4,809,900	1,026,200	16,919
3	Bonderized plate in can ends and electrolytic plate in both bodies and ends where possible	1,047,400	4,659,700	28,076,900	4,809,900	1,026,200	9,685
4	Bonderized and electrolytic plate in both bodies and ends where possible	1,047,400	4,659,700	22,432,600	11,345,300	135,000	8,325

The bonderizing process does not, per se, provide the necessary protection against either atmospheric corrosion on the exterior of the can or subaqueous corrosion on the interior. Its function is to provide a suitable substrate for organic coatings which are relied upon to provide the necessary protection against corrosion. Applied over a bonderized surface, organic coatings provide a degree of protection they will not provide when applied directly to an untreated steel surface. Unlike tin plate, any form of steel must carry an organic coating if early losses, as a result of subaqueous or atmospheric corrosion, are to be avoided.

Figure 2B illustrates underfilm corrosion, a mass of hairline rust formation which develops under clear organic films applied to untreated steel when exposed to the atmosphere. The rate of formation is dependent on the humidity and the moisture vapor impedance of the organic film. As shown in Fig. 2A, the effect is completely eliminated with bonderized plate regardless of the type of can enamel employed.

Although the uncoated bonderized surface can not be relied upon to prevent rust formation under all conditions of atmospheric exposure, it does impede the rate and, therefore, is of considerable value in preventing corrosion of the uncoated steel surface during transportation from steel mill to can factory. This has always been a source of annoyance with untreated black plate. Figure 3 illustrates the relative resistance to atmospheric corrosion of uncoated bonderized and untreated steel. For comparison are included a specimen of hot-dipped tin plate and also one treated by another phosphating process which consists in treating the steel surface with a 20 percent solution of phosphoric acid. The latter appears to provide as much, or more, rust resistance to the steel in the uncoated state as the bonderizing process, but as pointed out in subsequent paragraphs, is not the equal with respect to other essential factors.

On the inside of the can the effect of bonderizing the steel surface is especially apparent. There, without the phosphated substrate, all organic films (some more than others) undergo a loss of adhesion in contact with most foods, particularly during the thermal sterilizing process. The effect is aggravated by traces of oxygen present in the food or in the headspace of the can. Any loss of adhesion is followed by rapid corrosion of the steel, resulting in hydrogen swells, discoloration and the presence of enamel particles in the

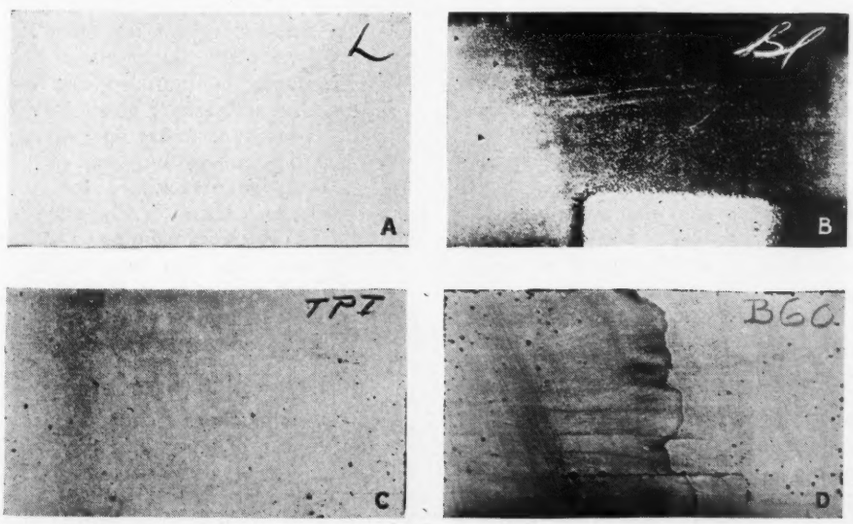


FIG. 3. Atmospheric corrosion of treated steels, uncoated. (A) Hot-dipped tin plate. (B) Deoxidized steel. (C) Phosphoric acid treatment. (D) Bonderized steel.

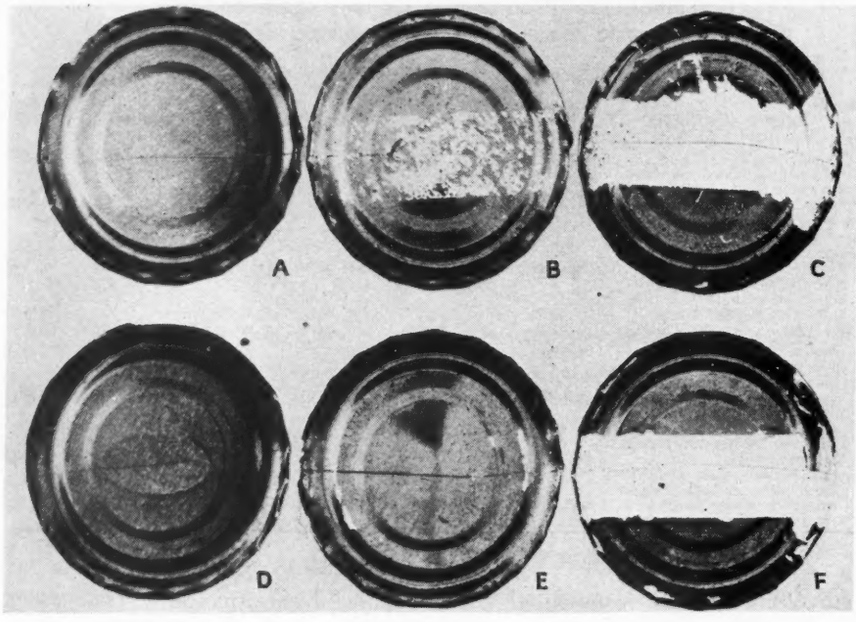


FIG. 4. Effect of surface treatment on adhesion of organic coatings applied to inside of can. Single coating: (A) Bonderized steel; (B) Phosphoric acid treatment; (C) Deoxidized steel. Double coating: (D) Bonderized steel: (E) Phosphoric acid treatment: (F) Deoxidized steel.

food. Figure 4 is shown to illustrate the effect of the bonderizing treatment, the adhesion being determined semi-quantitatively by the Scotch tape test applied to the film after the can has been emptied and washed.

It is apparent, by comparing the specimens A, B and C with D, E and F, that there is an advantage in the application of two coats of organic film to the metal. Figure 4B illustrates the fact that the phosphoric acid treatment of the steel referred to above is not as effective in preventing loss of adhesion as the bonderizing treatment. Although many dry products not given a thermal sterilizing treatment have been packaged successfully in cans from untreated steel, there seems to be little doubt from the experimental evidence at hand that cans for heat-sterilized foods will require the use of bonderized plate.

In Fig. 5 are shown the exteriors of two cans, one made from bonderized steel and the other from untreated steel. Both cans received a thermal process similar to that used in sterilizing corn. The advantage of the bonderizing treatment is at once apparent, both with respect to blistering of the organic film in contact with live steam and in the amount of abrasion produced by the double-seaming rolls in the formation of the end seams. Most organic films applied over a bonderized surface appear to possess a hardness and toughness superior to the same films applied over untreated steel.

Experimental evidence indicates that cans made from bonderized steel and properly coated can be expected to provide a service value commensurate with emergency conditions for most food products having a pH value of 5.5 or higher. It does not appear adapted to foods below pH 5.0. For example, in an experimental pack of tomato juice (pH 4.2 to 4.4), stored for nine months at room temperature, 2.6 percent of the cans with bonderized ends and tin plate bodies were hydrogen swells, and in those cans made completely from bonderized steel 86 percent were in the same condition.

More experimental work is necessary to establish the behavior in the range of pH 5.0 to 5.5. One experimental pack of chili con carne (pH 5.3) in full-bonderized cans, held for eight months at room temperature, has shown no indication of failure. However, a pack of green beans (pH 5.2) held for only six months at room temperature developed 0.5 percent hydrogen swells in cans that were somewhat overfilled. Properly filled cans in the same pack were still normal at the end of the period.

In normal can-making practice the formation and bumping of the locked-up portion of the side seam results in rupture of any coating previously applied to the steel. When tin is present, as in tin plate, this is of little consequence inasmuch as tin has the unique property of assuming an anodic relation to iron under the conditions found in a sealed can, and thereby exerts an electrochemical effect, protecting the iron from corrosion even at points where the tin coating may be broken. In the absence of tin, as in a bonderized steel can, the effect is lost, and to compensate therefor, the can manufacturers will find it necessary to apply a film of organic coating over the side-seam area after the can body is formed and soldered. This entails a considerable equipment problem.

Electrolytic Tin Plate

Electrolytic tin plate is exactly what the name implies—a coating of tin applied to steel by an electrolytic process. By virtue of the uniform application attainable in this process, it is possible to obtain coatings as low at 0.1 lb. per base box, as contrasted with the hot-dipping process, wherein coatings averaging less than 1.2 lb. per base box (pot-yield basis) are usually unsatisfactory and difficult to apply. At least, in the early stages of conservation, a 0.5-lb. coating will be employed in can manufacture, that being the lightest on which appreciable information regarding behavior with canned foods is available.

At the present time there are two general types of electrolytic coatings—those deposited from an acid solution of stannous sulphate containing sulphonic acids, gelatin and other additives; and those deposited from an alkaline bath of sodium stannate. The former is based on a German patent pioneered in this country by the Carnegie-Illinois Steel Co.; the latter on a patent held by Crown Cork & Seal Co.

Each type of can can be produced in several finishes—matte, brushed and flow brightened. The matte finish is that of the plate as it leaves the electrolytic bath and possesses a rather dull-white appearance quite different from the familiar mirror-like finish of hot-dipped tin plate. The brushed finish is produced by polishing the tin surface with a nickel-silver brush, giving the plate a bright satin-like appearance. It is this type which has been available to can manufacturers for the longest time and, therefore, the one the behavior of which in canning practice is best known. The flow brightened or "fused" finish results from melting the electrolytically deposited coating *in situ* by any one of a number of methods—hot oil, hot air or electrical resistance heating of the steel. The result is an appearance difficult to distinguish from hot-dipped tin plate; in fact, the surface is almost identical with the conventional tin plate. Also, there is some formation of tin-iron alloy during the melting operation, and in this respect the fused coating bears a further re-

semblance to hot-dipped plate.

Which of the types and finishes will prove most satisfactory for can manufacture in the end must await further experimentation. At present there is a definite tendency to favor the fused finish, not only for the sake of appearance but also for its improved soldering characteristics and resistance to subaqueous corrosion. Up to the present time the acid-electrolyte, brushed-finish plate has exhibited a stained appearance and poor soldering characteristics where it has been held at temperatures above 400 deg. F. necessary to bake certain types of can enamels. Although the composition of the electrolyte appears to be a factor in this, the fact remains that the characteristic is pretty well lost when the coating is melted.

The presence of some tin on electrolytic plate provides it with a corrosion resistance superior to that of bonderized steel, particularly in acid media. It is expected, therefore, to have a wider range in applicability to can manufacture than bonderized steel. Nevertheless, in the light-weight coatings necessary to effect a substantial conservation of tin, it cannot be said to possess the corrosion resistance of hot-dipped tin plate with tin coatings of 1.25 lb. per base box or higher. Up to this time, most of the corrosion studies have been made on the acid-electrolyte, brushed-finish type, carrying 0.5 lb. of tin per base box. Plain cans made from this plate without an inside enamel coating have not given a satisfactory account of themselves with a number of food products for which plain, hot-dipped, plate is admirably suited. There is a relatively rapid dissolution of tin in the food, early formation of hydrogen swells and, in those products containing sulphur-bearing proteins, an intense staining of the plate through formation of iron and tin sulphides. Table V gives a comparison of the relative corrosion resistance of hot-dipped tin plate with plain, brush-finished, electrolytic plates in several weights of tin coating. The comparison is shown for the accelerated hydrogen evolution test[4] and also for can service life tests with dried prunes in sirup and yellow cling peaches.

TABLE V—Comparison of Corrosion Resistance of Electrolytic and Hot Dipped Tin Plates.

Type plate	Wt. of tin coating (lb./BB)	Hydrogen evolution test (hours)	Service life with Y. C. peaches (failures per M after 413 days at 110° F.)	Service life with dried prunes in sirup (days to 50% failure at 100° F.)
Electrolytic..	0.44	13.7	1000	100
Electrolytic..	0.48	15.7	544	133
Electrolytic..	0.60	25.8	0	172
Electrolytic..	0.68	21.4	44	201
Electrolytic..	0.75	28.4	0	215
Electrolytic..	0.97	40.3	0	258
Hot-dipped.. (type-M plate)	1.40	52.6	0	321

NOTE: Service-life values shown are for plain cans, not enameled.

From inspection of the data shown in Table V it is obvious that the corrosion resistance of the plain plate varies directly with the weight of tin coating and that as the weight approaches that of hot-dipped tin plate the corrosion resistance does likewise.

Figures 3A and 6 illustrate the relative resistance to atmospheric corrosion as indicated by the amount of rust formation in a given period of time. Here again it is apparent that the corrosion resistance is proportional to the weight of tin coating. The application of a very light film of palm oil is a factor in improving the resistance of electrolytic plates to atmospheric corrosion.

While the application of plain electrolytic plates with light-weight tin coatings to food-can manufacture, at least in their present stage of development, is not encouraging, the story is quite different when the can is enameled using the same technic necessary in enameling cans made from bonderized steel. Here the experimental evidence at hand indicates that commercially satisfactory results can be obtained with a wide range of food products, including many of those in the acid class, pH 5.0 and lower. The projected tin conservation, shown in Table IV, contemplates the use of electrolytic plate on all products for which bonderized steel cans are unsuited, with the exception of a few in the most corrosive class, designated by the industry as Class I. In this class are such items as the berries, cherries, fermented and pickled foods, pectin, nicotine sulphate, and so forth. Even with these, however, there is an indication that the electrolytic plates with tin coatings in the neighborhood of 0.9 to 1.0 lb. per base box may provide in service all that can be expected under emergency conditions.

While in rust resistance the 0.5-lb. electrolytic coating is not the equal of the hot-dipped tin plate, it is expected that the outside of the can will have to be enameled only when subjected to the most adverse atmospheric conditions; for ordinary service the can manufacturers are not expecting to enamel the exterior.

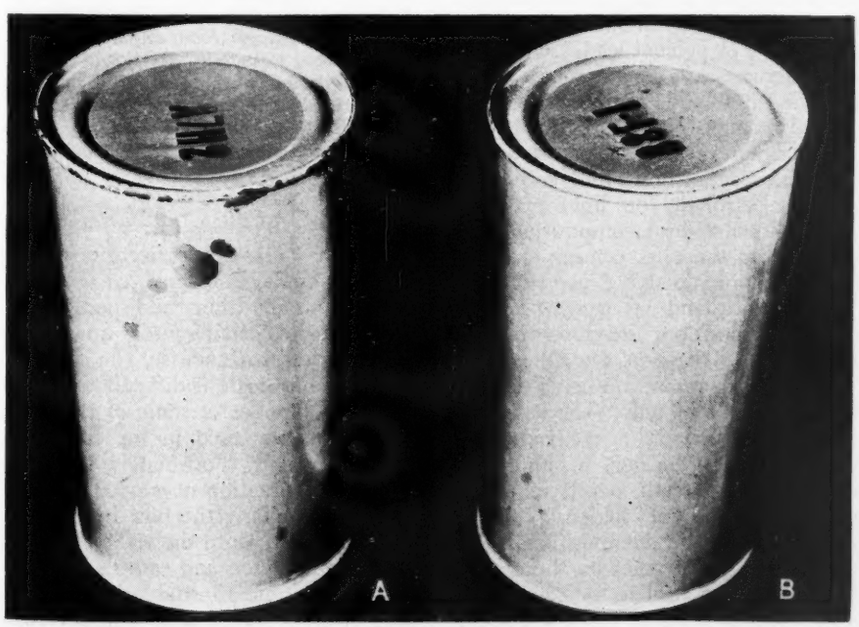


FIG. 5. Effect of surface treatment on adhesion of outside protective coatings. (A) Deoxidized steel. (B) Bonderized steel.

Containers for Items Eliminated by Order M-81

The authors of WPB Order M-81 had only the conservation of tin in mind at the time the order was written. When it was promulgated it was expected by everyone concerned that the can manufacturers would produce cans from enameled deoxidized or bonderized steel for a majority of the items eliminated by the order, including coffee, oil, tobacco, animal foods, and so on. However, the rapidly developing defense effort has given it the effect of a steel conservation as well as a tin conservation order. The prodigious demand for steel in strictly defense

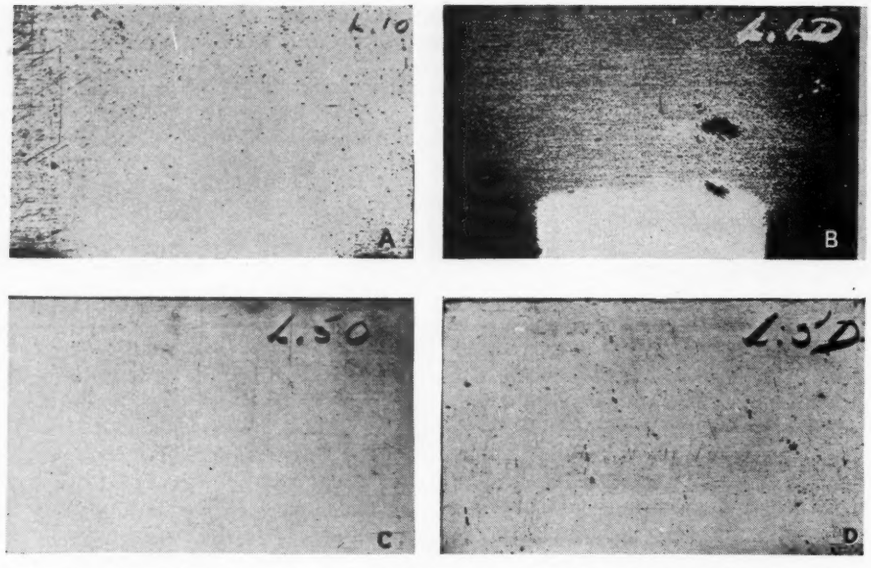


FIG. 6. Atmospheric corrosion of electrolytic tin plate (brushed finish). (A) 0.1-lb. coating, oiled. (B) 0.1-lb. coating, unoiled. (C) 0.5-lb. coating, oiled. (D) 0.5-lb. coating, unoiled.

production has made it necessary for the War Production Board to assign an A-1-a rating to all steel tonnage required for cans permitted under the order. By the same token the WPB has not seen fit to assign any such high rating to steel for cans in which the use of tin plate is not permitted, and consequently users of cans for products not permitted in the tin conservation order have not been able to obtain cans from either enameled bonderized or deoxidized steel even though no order exists prohibiting their use. In short, the steel situation, as this is written, is much tighter than the tin situation.

Anxiously awaited by many is an order specifying the use of bonderized or deoxidized steel for certain of the items eliminated in the Tin Conservation Order, the assumption being that the steel tonnage required by such an order will carry a rating high enough to be procurable. In the meantime there is a rapid conversion to fiber containers for products that do not require a sterilizing process, and to glass in the case of those products which are not eliminated in Orders M-104 and M-119 restricting the use of metal closures and rubber gaskets on glass containers.

Conservation of Tin in Solder

It is estimated that in 1940 the can-making industry used about 4,500 tons of tin in the production of solder. Most of the solder used was 40 percent tin, 60 percent lead alloy. There is obviously room for conservation of tin in solder, and WPB Order M-43-a requires that, after May 1, 1942, the solder used shall not contain more than 30 percent tin. This is only a half-way measure and further restrictions can be expected.

Intensive investigation on the part of the can-manufacturing industry has disclosed the fact that tin-lead compositions, carrying only 30 percent tin and less, do not produce as strong a solder bond as the 40–60 composition used heretofore, and that some danger attends its use in cans, particularly those that are subjeced to considerable strain during the thermal sterilizing and cooling operations. This is brought out in creep tests at sterilizing temperatures (250 deg. F.) illustrated in Fig. 7. A solder composition which appears to offer greater possibilities, both as regards bonding strength and conservation of tin, is one containing 2½ percent silver and 97½ percent lead. Certain can manufacturers are already employing it to some extent. The indications are that it will produce a solder bond even stronger than the 40 percent tin, 60 percent lead composition. In operation, on either electrolytic or hot-dipped tin plate, the silver-lead composition picks up tin from the cans, coming to equilibrium at approximately 2 percent silver, 5½ percent tin and 92½ percent lead. It is this composition, therefore, that will be applied to the cans, the 2½ percent, 97½ percent composition being used for make-up purposes only. The silver-lead composition having a relatively high melting point, 586 deg. F., and being close to the eutectic point, requires a somewhat different soldering technic than the lead-tin compositions. The problem is usually met by the application of auxiliary heat to the edges of the solder cut, at a point between the end of the solder roll and the wiping station, in order to prevent freezing of the solder before the excess can be removed at the wiper.

Unfortunately, the silver-lead composition has not proved satisfactory so far in soldering bonderized or deoxidized steel; it fails to alloy with the steel. So far as known at the present time, can manufacturers will have to continue using a relatively high tin solder on steel cans, but it seems advisable for the War Production Board to permit this, inasmuch as there is almost ten times as much tin to be saved by conversion of tin plates as there is in substituting a tinless solder for the 40 percent tin, 60 percent lead composition.

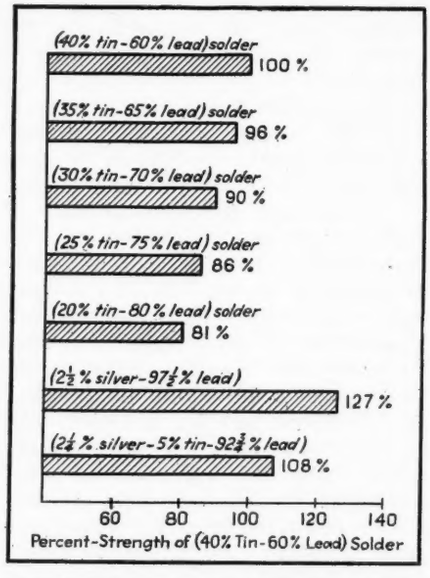


FIG. 7. Relative bonding strengths of lead-tin and lead-silver solders at 250 deg. F., expressed as percentage of 60 percent lead, 40 percent tin solder. Note: The 2½ percent silver, 97½ percent lead solder is eutectic solder mixture before tin pickup occurs; the 2¼ percent silver, 5 percent tin, 92¾ percent lead solder is a composition actually experienced when manufacturing cans wherein tin pickup has stabilized the solder bath.

Organic Coatings

In the past the conventional can enamel has been formulated with the strongly drying tung and perilla oils, both obtained from sources now under enemy control. Likewise, the shipping situation has made it difficult to obtain adequate supplies of some of the fossil resins normally used in the formation of can enamels. Fortunately, a moderately tight situation developed in these items, particularly the oils, long before America's entry into the war. This gave can manufacturers and varnish makers a reasonable time to study the problem and develop substitutes. Happily, castor oil of South American origin can be processed to conjugate the double bonds

in the fatty acid portion of the molecule, thereby developing in it drying characteristics aproaching those of tung oil.

This dehydrated castor oil, together with a number of synthetic resins produced domestically, has considerably relieved the situation with respect to organic coatings suitable for can manufacture. This is fortunate inasmuch as the substitution of bonderized steel and electrolytic tin plate for hot-dipped tin plate must necessarily increase the requirements of can manufacturers for organic coatings.

It is needless to say that the current rubber situation is the cause of some concern among can makers. Already the WPB has found it necessary to curtail the use of rubber in gaskets for glass closures. Fortunately for the metal can, the amount of rubber required per unit of container capacity is relatively small (0.16 lb. per thousand No. 2 cans) and, as yet, no restriction has been ordered. Nevertheless, steps are being taken to reduce the percentage of rubber in the gasketing compounds by 50 percent, and active investigation now underway is expected to develop substitutes entirely free from either natural or synthetic rubber. If worse came to worst, can makers might perhaps return to the use of the old paper gasket and all the troubles attendant on it. It is hoped that technological advance under the pressure of the emergency will make it unnecessary to again use the paper gasket.

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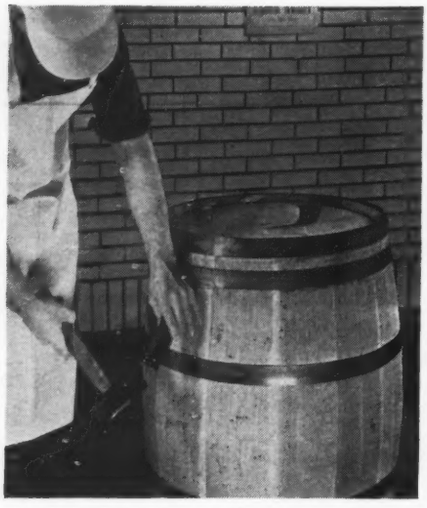
DIRECTORY OF EGG DRIERS

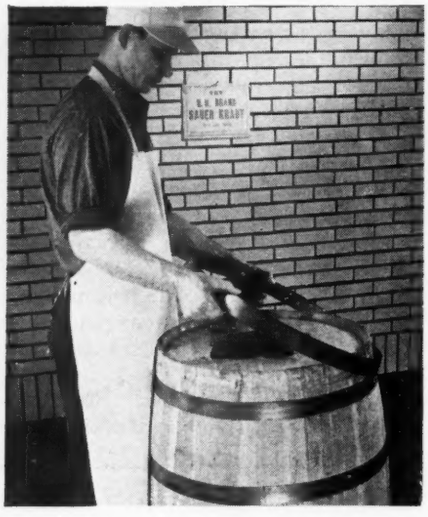
Plants in operation and contracted to be built, as of July 1, 1942.

NAME	LOCATION	SYSTEM
Alberta Poultry & Marketing Board	Edmonton, Alberta	Spray (Esdon)
‡Anamosa Poultry & Egg Co.	Anamosa, Iowa	Spray (Mojonnier Bros., Inc.)
Armour & Co.	Dennison, Iowa	Spray (C. E. Rogers Co.)
	Sedalia, Mo.	Spray (C. E. Rogers Co.)
	Springfield, Mo.	Spray (2) (Douthitt Corp.) (Own Unit)
	Louisville, Ky.	Spray (C. E. Barnhill)
	Mankato, Minn.	Spray (C. E. Barnhill)
Arnold Co., Robert	North Bergen, N. J.	Spray (Own Unit)
Bellevue Creamery & Produce Co.	Omaha, Neb.	Spray (C. E. Barnhill)
Borden Co.	Fayetteville, Tenn.	Spray (Own Unit)
	Columbus, Wis.	Spray (Own Unit)
	Belmont, Que.	Spray (Own Unit)
	Winnipeg, Manitoba	Spray (Own Unit)
Bowman Dairy Co.	Harvard, Ill.	Spray (C. E. Rogers Co.)
	Brooklyn, Wis.	Spray (C. E. Rogers Co.)
Bradley Produce	Harrison, Ark.	Spray (C. E. Barnhill)
Burns & Co.	Calgary, Alberta	Spray (Tranin)
Canada Egg Products, Ltd.	Saskatoon, Sask.	Spray (Esdon)
Canadian Doughnut Co., Ltd.	Trenton, Ont.	Spray (Douthitt Corp.)
Center Milk Products Co.	Trenton, Mo.	Spray (Douthitt Corp.)
Chicago Vitreous Enamel Products Co.	Cicero, Ill.	Spray (Western Precipitation Co.)
Christian and Co.	Pittsburgh, Pa.	Spray (C. E. Barnhill)
Colby Dairy Products	Wilkesboro, N. C.	Spray (C. E. Rogers Co.)
Colfax Co-op. Creamery	Colfax, Wis.	Spray (Douthitt Corp.)
Commercial Creamery	Spokane, Wash.	Spray (Goodhue)
Conestoga Cream & Cheese Co.	Lima, Ohio	Spray (Douthitt Corp.)
Cow & Gate	Gananoque, Ont.	Spray (Douthitt Corp.)
Cudahy Packing Co.	Cuero, Tex.	Spray (Own Unit)
	Washington Court House, Ohio	Spray (Own Unit)
Denison Poultry & Egg Co.	Denison, Tex.	Spray (3) (C. E. Barnhill)
Des Moines Co-operative Dairy	Des Moines, Iowa	Spray (C. E. Rogers Co.)
DeSoto Creamery	Waconia, Minn.	Spray (Douthitt Corp.)
Domestic Egg Products Co.	McKenzie, Tenn.	Spray (Douthitt Corp.)
	Chickasha, Okla.	Spray (Douthitt Corp.)
	Wichita Falls, Tex.	Spray (Douthitt Corp.)
Doughnut Corp. of America	New Berlin, N. Y.	Spray (Douthitt Corp.)
	Frankfort, N. Y.	Spray (Douthitt Corp.)
***	Ogdensburg, N. Y.	Spray (Douthitt Corp.)
Dried Food Processors Corp.	Eau Claire, Wis.	Spray (Douthitt Corp.)
Dunkel, Samuel	New York, N. Y.	Spray (Own Unit)
***	Bovina Center, N. Y.	Spray (Own Unit)
Egg Dryers, Inc.	Cedarburg, Wis.	Spray (Own Unit)
*Emulsol Corp., The	Chicago, Ill.	Fan (Own Unit)
Fairmont Creamery Co.	Crete, Neb.	Spray (Douthitt Corp.)
	Moorhead, Minn.	Spray (Douthitt Corp.)
Farmers' Equity Creamery Co.	Lima, Ohio	Spray (C. E. Rogers Co.)
Fort Worth Poultry & Egg Co.	Fort Worth, Tex.	Spray (Douthitt Corp.)
	(2 plants)	Spray (C. E. Rogers Co.)
		Spray (Own Unit)
	Lampasas, Tex.	Spray (C. E. Rogers Co.)
***Fraser Valley Co-op. Assn.	Vancouver, B. C.	Spray (Douthitt Corp.)
**Gartenberg & Co., Inc., H.	Chicago, Ill.	Spray (Own Unit)
Gross Egg Co.	Bloomer, Wis.	Spray (Own Unit)
Harp., O. G., Poultry & Egg Co.	Shawnee, Okla.	Spray (2) (C. E. Barnhill)
Hazelwood, Inc.	Portland, Ore.	Spray (C. E. Barnhill)
Henderson Produce Co.	Monroe City, Mo.	Spray (Douthitt Corp.)
Henningsen Bros., Inc.	Denison, Tex.	Spray (Kraft Company)
	Fort Worth, Tex.	Spray (Douthitt Corp.)
	Lamesa, Tex.	Spray (Douthitt Corp.)
Herndon Produce Co.	Dallas, Tex.	Spray (C. E. Barnhill)
Hiawatha Dairy Co.	Hiawatha, Kans.	Spray (Douthitt Corp.)
Hood, C. H., & Co.	St. Albans, Vt.	Spray (C. E. Rogers Co.)
Iowa Egg Products Co.	Dubuque, Iowa	Spray (2) (C. E. Barnhill)
Jensen & Sons, T.	Chanute Kans.	Spray (Donaldson)
Jerpe Commission Co.	Omaha, Neb.	Spray (2) (Cardwell-Westinghouse Co.) (Mojonnier Bros., Inc.)
Kirby Egg Products Corp.	New Berlin, N. Y.	Spray (Douthitt Corp.)
Kress Produce Corp.	Chicago, Ill.	Spray (Burner Processes, Inc.)
Land O' Lakes Creamery Co.	Ripon, Wis.	Spray (Douthitt Corp.)
***	Superior, Wis.	Spray (Douthitt Corp.)
Liggett Co., Harry M.	Topeka, Kans.	Spray (C. E. Barnhill)
Louisiana Egg Products Co.	Ruston, La.	Spray (Douthitt Corp.)
Lowe, Joe, Corp.	San Antonio, Tex.	Spray (Donaldson)
	Winnipeg, Manitoba	Spray (Tranin)
Malt-Diatase Co.	Brooklyn, N. Y.	Spray (C. E. Rogers Co.)
Maple Island Dairy Co.	Stillwater, Minn.	Spray (2) (C. E. Rogers Co.)
Market Produce Co.	Fort Worth, Tex.	Spray (C. E. Barnhill)
Marshall Kirby & Co.	Jersey City, N. J.	Spray (Own Unit)
	Terre Haute, Ind.	Spray (Own Unit)
Marshall Produce Co.	Marshall, Minn.	Spray (Douthitt Corp.)
Marshfield Dairy Products Co.	Marshfield, Wis.	Spray (Douthitt Corp.)
Mid-States Frozen Egg Co.	Indianapolis, Ind.	Spray (Mojonnier Bros., Inc.)
Milk Products, Inc.	Eau Claire, Wis.	Spray (Douthitt Corp.)
Mitchell Produce Co.	Mitchell, S. D.	Spray (Barker)
Monark Food Products, Inc.	Hutchinson, Kans.	Spray (C. E. Barnhill)
Moss, David L., & Co., Inc.	Chicago, Ill.	Spray (Own Unit)
Omaha Cold Storage Co.	Omaha Neb.	Spray (Barker)
Ottawa Dairy	Ottawa, Ont.	Spray (Douthitt Corp.)
Parrott, W. B., Co.	Manning, Iowa	Spray (Douthitt Corp.)
Pet Milk Co.	Wayland, Mich.	Spray (C. E. Rogers Co.)
Pevely Dairy Co.	St. Louis, Mo.	Spray (C. E. Rogers Co.)
Pietrus & Sons, A. J.	Sleepy Eye, Minn	Spray (Douthitt Corp.)
Powdered Foods, Inc.	West New York, N. J.	.....
Priebe & Sons, Inc.	Manning, Iowa	Spray (Douthitt Corp.)
Red 73 Creamery Co.	Union City, Ind.	Spray (C. E. Rogers Co.)
***Rockford Dairies	Rockford, Ill.	Spray (C. E. Rogers Co.)
Rothenberg & Schneider	Colfax, Wis.	Spray (Douthitt Corp.)
Rubenstein, Sid.	Dallas, Tex.	Spray (C. E. Barnhill)
Saline Co. Milk Producers' Ass'n.	Marshall, Mo.	Spray (Douthitt Corp.)
Schreiber, L. D., & Co.	Chicago, Ill.	Spray (Own Unit)
‡Seymour Packing Co.	Topeka, Kans.	Spray (Mojonnier Bros., Inc.)
Sheboygan Produce Co.	Sheboygan, Wis.	Spray (Own Unit)
‡Short Produce Co.	Valparaiso, Ind.	Spray (Mojonnier Bros., Inc.)
Silvers & Danches	Highland, Ill.	Spray (C. E. Rogers Co.)
Sondra Food Products	Walton, N. Y.	.....
	Andes, N. Y.	
Stamper, F. M., Co.	Moberly, Mo.	Spray (Douthitt Corp.)
Super Spray	Philadelphia, Pa.	Spray .....
Swift & Co.	Des Moines, Iowa	Spray (Douthitt Corp.)
	Sedalia, Mo.	Spray (Douthitt Corp.)
	Muskogee, Okla.	Spray (Douthitt Corp.)
	Fort Worth, Tex.	Tunnel (Own Unit)
	Toronto, Canada	Spray (Douthitt Corp.)
Texas Dehydration Products Co.	Fort Worth, Tex	Spray (C. E. Barnhill)
Tranin Egg Products Co.	Kansas City, Mo	Spray (Own Unit)
	Chicago, Ill.	Spray (Own Unit)
Tri-State Produce Co.	Sioux City, Iowa	Spray (C. E. Barnhill)
Twin Ports Co-op. Assn.	Superior, Wis.	Spray (Douthitt Corp.)
Verifine Dairy Prod.	Sheboygan, Wis.	Spray (Own Unit)
Victory Egg Products Co.	St. Louis, Mo.	Spray (C. E. Rogers Co.)
Virginia Dehydrating Corp.	Harrisonburg, Va.	Spray (Mojonnier Bros., Inc.)
Waconia Co-op. Dairy Co.	Waconia, Minn.	Spray (Douthitt Corp.)
Washington Co. of Poultry & Egg Co.	Lyndon, Wash.	Spray (Douthitt Corp.)
Wilder, T. E., & Associates.	Platteville, Wis.	Spray (Douthitt Corp.)
Wilson & Co.	Atchison, Kans.	Spray (Cardwell-Westinghouse Co.)
	Abilene, Texas	Spray (C. E. Barnhill)
Wisconsin Commission Co.	Platteville, Wis.	Spray (Douthitt Corp.)
Wisconsin Dried Egg Co.	Oconto, Wis.	Spray (C. E. Rogers Co.)

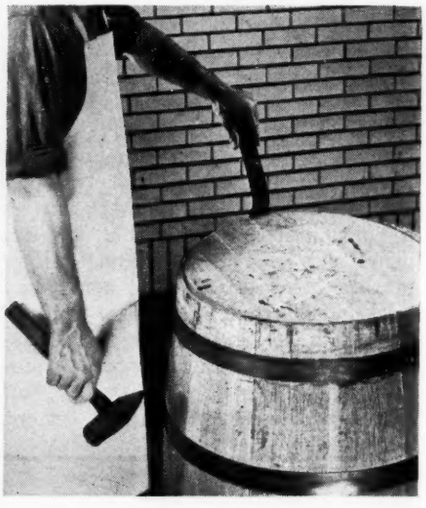
*Whites only **Technical egg products only ***Resumed skim milk drying ‡Installation under construction in June



How to loosen the hoops on a barrel.



Removing the top hoop.



Lifting the head.

Things You Should Know About Barrels

By GEORGE T. DYER, JR.

Pioneer Cooperage Co., Chicago, Ill.

One way of meeting some of the wartime container problems is to go back to barrels. Fortunately, the many types of barrels available make this container suitable for several food products. And if you have been using a bulk container which you no longer can obtain, don't overlook the possibilities of the 10- or 15-gal. keg.

THERE are two types of wood barrels—slack barrels for dry products and tight barrels for liquids and extremely heavy dry products. This article will be concerned only with tight barrels. These can be made from white oak, red oak, gum, douglas fir, ash, basswood and birch, and in sizes from 1 to 60 gal. The staves and heading vary in thickness from about ½ in. on the smaller sizes to about ¾ in. for full-size barrels. Heavy, flat, steel hoops are used to hold the staves together. The edges of the staves are planed in such a way that each stave fits perfectly against the next one. No adhesive of any kind is used between the staves, and the barrel is made leakproof by reason of this perfect fit, which is maintained by the downward pressure of the hoops.

The heads are fitted into a groove called the "croze," and held in place by the head hoop. The heads are always placed in the barrel so that the grain runs toward the bung stave, the stave in which the bung hole is bored and over which the rivets of the hoops are lined up.

In addition to regular barrels and kegs, a few manufacturers make light kegs out of fir and pine, which are suitable for certain products. These are made from ⅜-in. staves, and are hooped with light-weight rolled-edge or Brainard hoops. As distinguished from slack kegs, such kegs are liquid tight, but they will not stand up under the extreme rough handling normally given to heavier kegs and barrels.

Inside Coatings

Barrels are sometimes used without any lining, but for most purposes a lining, either paraffine, silicate of soda, or glue, will give most satisfactory results. Generally speaking, silicate of soda is used for oils, glue for alcohol and petroleum derivatives and paraffine for most other products. Paraffine has a melting point of around 130 deg. F., so barrels lined with this material should not be filled hot. Silicate has a much higher melting point, and for this reason is usable for many products which must be filled hot, but it is, to a limited extent, soluble in water. Glue cannot be used where any water is present. Barrels and kegs are not suited to holding materials that require pasteurization, as the barrel is likely to permit air to enter and spoil the product. Material of this type should have a preservative added to prevent fermentation or spoilage.

Storage and Handling

Empty barrels, as delivered by the manufacturer, are perfectly tight and ready to fill. If stored away from extremes of moisture or dryness, they will stay tight indefinitely. Because they are made of wood, barrels are subject to changes in moisture. If stored in a very dry place, they will give off moisture and shrink. If stored in a damp place, they will absorb moisture and swell. If, after having been exposed to dampness, they are later put in an extremely dry place, the consequent shrinkage would cause the barrel to open up in the joints between the staves and leak. If stored where shrinkage can take place, *i.e.*, a hot or very dry place, the barrel should be tightened by driving the hoops down, first at one end and then at the other, until they fit tightly. The tools required for this operation are a heavy hammer (about 3 or 4 lb.) and a hoop driver, which can be obtained from any reasonably well equipped hardware store.

If the barrels have been stored where they have had a chance to absorb moisture, they will be tight when filled, but shrinkage is likely to take place at a later time when the filled package is stored where the air is dry. For your customers' satisfaction, store your empty barrels in a dry rather than a damp storeroom. When the barrels are filled, the bung should be driven tightly, and for extra protection, shaved off even with the stave with an adze or hatchet. A bung strap or bung plate can be attached, but this is not absolutely necessary, as the compressed bung will swell from the inside when it comes in contact with the moisture of the barrel's contents, and produce a tight seal.

Filled barrels are most easily moved and stored on the bilge or side. When they are to be moved from the filler to the storage place, they can be more easily handled by rolling on a skid built by laying two 2x4's about 10 in. apart. The barrels can be pushed on these skids, and they will follow curves without falling off. When stored, the barrels should be placed on the bilge with the bung up, to take advantage of the greater strength of the end grain of the heading as compared with the side grain. By laying skids across the ends of a row of barrels, the barrels can easily be tiered.

After storing and before shipment, the hoops should be checked to see that they are tight, and a general inspection should be made of the barrel to be sure that no leakage is apparent.

Repairing

There are a few causes of leaks that are easily corrected, and these should be understood by the warehouse men charged with filling and checking barrels. The wood may have small pinholes that are sometimes overlooked by the barrel maker. These leaks can be stopped if you will enlarge the hole by driving a small nail into it, and plugging it with a hard wooden peg, or the stub of a wood match. A leak through a streak in the wood can be stopped by driving a similar plug at each end of the streak, thus blocking its passage to the interior of the barrel.

A rough joint, which permits leakage between the staves, can be caulked with string or cloth forced well into the joint above and below the point of apparent leakage, using a blunt edge cold chisel or screwdriver. Leakage caused by a rough joint in the head can be stopped in the same way. A barrel with a broken head or stave should be dumped, and no attempt made to fix it except by replacing the broken part. This can be done only when the barrel is empty, and by a man experienced in handling barrels.

Loading

When loading the barrels in a boxcar, they should be stood on end, but great care should be taken in up-ending them so that they do not fall too heavily on the head. Because of the barrel's construction with a high bilge, it is quite easy to rock and up-end it. But if it is allowed to fall, a shift in the staves may take place which would crack the lining and cause the barrel to leak. The barrels should be placed tightly together, starting at one side of the car for the first row, and at the opposite side for the second row, and then alternating throughout the length of the car. At the ends of the car, 2x4's should be nailed on the floor and also at the top of the barrel to hold the bilge away from the car, so that the shocks of starting and stopping in transit will be carried at the top and bottom of the barrel rather than at the bilge.

The manufacturers of steel strapping are well equipped to aid you in adopting the latest type of loading for your particular commodity. In some cases it is best to strap part of the load together, allowing it to move in the car. But in most cases, a rigid load is advocated, secured by steel straps or wood bracing.

Emptying

Emptying the barrel is not primarily the responsibility of the packer, but much can be done to simplify this operation by advance planning. For liquid which can easily flow through a faucet, a faucet hole should be bored and bunged up before assembly of the barrel is completed by the manufacturer. This hole can be put either in the head, opposite the bung stave, or in the bung stave between the head and quarter hoop.

When the first method is used, the barrel is tapped lying on its side. This is the preferred method. When the faucet bung is bored in the stave, the barrel is emptied standing upright. Whichever method is employed, with the barrel in such a position that the faucet bung is up, a faucet should be placed directly against the bung. And by tapping with a hammer, the faucet is driven securely into the hole and the small bung is pushed ahead of it into the barrel. The barrel is then set on a rack with the faucet down, at sufficient height above the floor to permit the withdrawal of the contents. A small vent can be bored in the main bung or in the head, depending on which method is used.

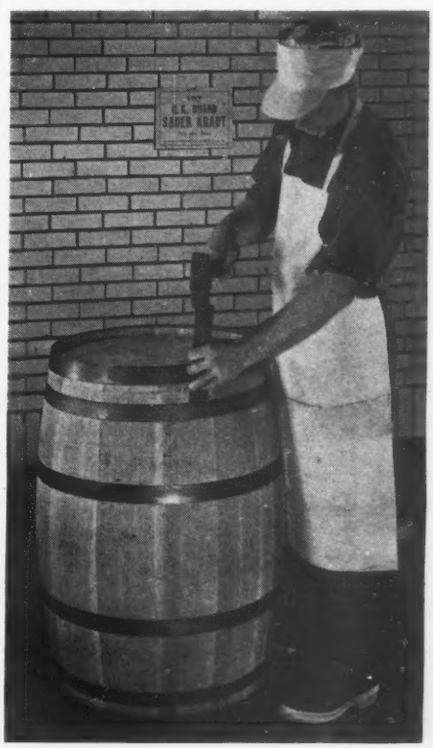
When the barrel is to be emptied of its entire contents at one time, the simplest way is to remove the bung in the side and pour the contents out through the bung hole. The bung can be removed by using a bung starter. But perhaps the easiest way is to split it with the grain, using a cold chisel or screwdriver. A small vent can be bored in the head to speed the flow if necessary.

When the contents will not flow through a faucet nor run directly from the bung hole, the head will have to be removed and the contents taken out this way.

If the merchandise is packed in a brine or other liquid, it is better to withdraw a part of the liquid before opening the barrel. This eliminates any danger of spillage or loss of liquid.

Removing Head

To remove the head, first loosen the second or quarter hoop slightly, and then remove the head hoop. This will cause the staves to spring enough to permit the removal of the head if it is tapped lightly to loosen it from the croze or groove in which it is held. When the barrel is emptied, care should be used not to harm the head or staves, as the resale value of an uninjured barrel will be much higher. Where it is necessary to remove the head for filling and emptying, a special type of croze construction can be furnished, which simplifies this operation to a certain extent.



Tightening the hoops after the head has been replaced.

Control Island Helps To Reduce Truck Costs

Accommodates master control sheet and provides convenient facilities for putting gasoline, oil and water into trucks. Control sheet can be utilized to cut mileage and conserve tires, fuel, oil and the vehicles themselves.

COMPLETED prior to the declaration of war, the truck control island built by Foremost Dairies, Inc., at its main plant in Jacksonville, Fla., will help to reduce the company's trucking operating expenses for the duration.

A master control form is filled out on this control island platform. This originally was intended as a means of preventing shortages of gasoline and oil and of furnishing gasoline, oil and water at a minimum of expense. But it does more than that. It gives an accurate record of the route mileage run and can be utilized to conserve the tires of the combination ice cream and milk truck fleet. This is particularly important in view of the fact that under the present tire-rationing plan no new tires are available for trucks used in the retail delivery of milk to the final consumer.

Prior to the construction of the control island, gasoline was secured from the pump (in its present position), oil was obtained in one- or two-quart measures from a small stockroom about 75 ft. away from the pump, and water for the truck radiators was supplied by a hose whose control valve was located on a building wall 50 ft. away. To save the expense of moving the gasoline pump and its underground storage tank, the control island was built around the gasoline pump.

Arrangement of Island

As shown in the accompanying illustrations, the control island consists of a concrete platform approximately 4 ft. wide by 16 ft. long by 6 in. high, with a corrugated iron roof.

On the platform are located the gasoline pump, the control desk with a suspended electric light and shade and a large electric clock, four conventional 50-gal. oil highboys or tanks, and a portable 16-qt. water can or pail with a long curved spout. These are but the physical fittings of the control island. It is the system set up to make use of these accessories which provides the money-saving control on the fleet operation.

The island is located in the open yard adjacent to the Foremost milk and ice cream plant. Because of the regularity of the Florida weather and the absence of snow, the Foremost trucks are "garaged" overnight in the open air—this is the ordinary procedure with many fleets throughout Florida and the South.

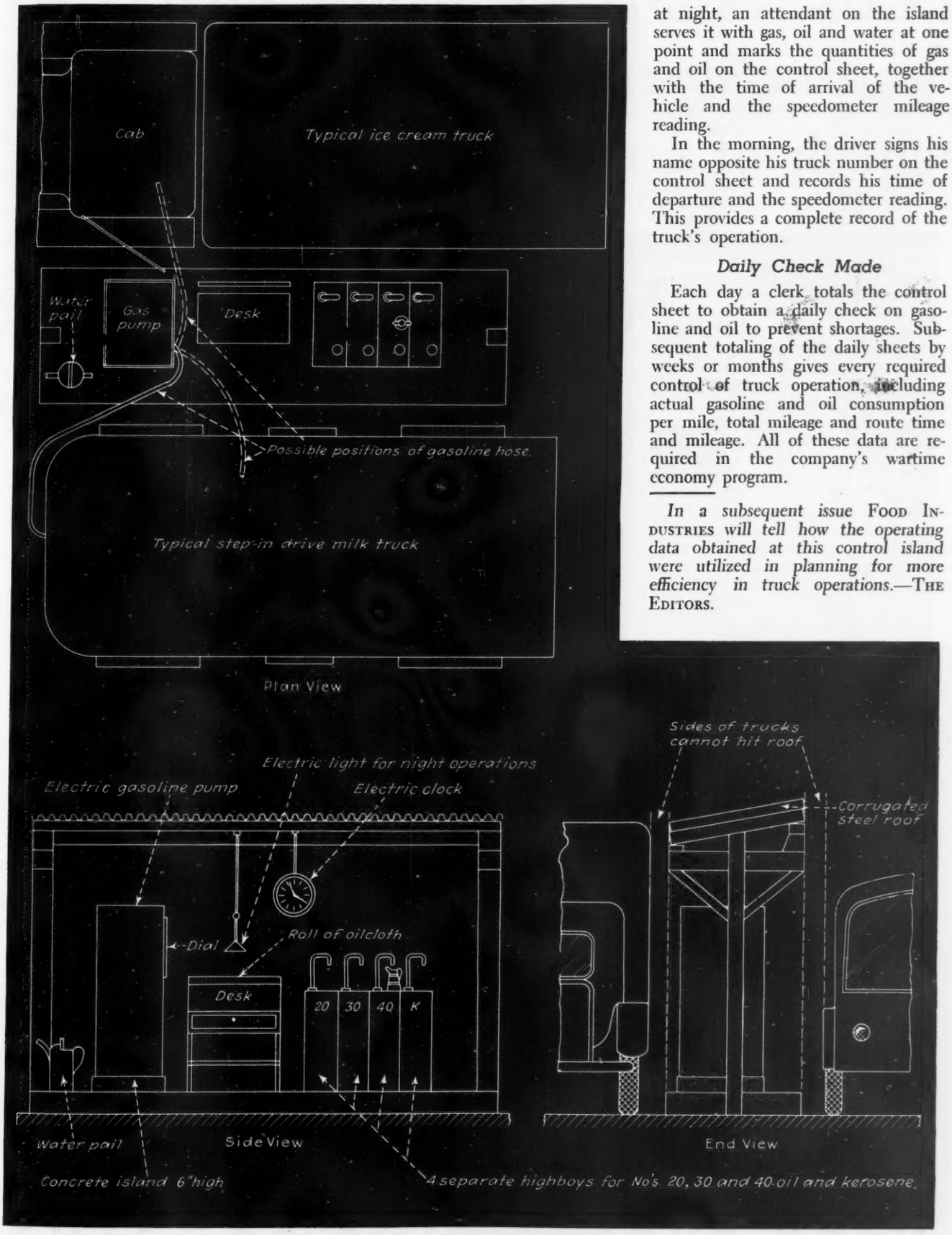
Protection Against Rain

It is, therefore, only necessary to protect the control sheet placed on the island desk against rain and dew. Open on all sides, the roof protects against rain downpours. A piece of oilcloth rolled up on top of the desk is rolled down over the control sheet to protect it against wind-blown rain. This permits use of the control sheet over a full 24 hours of truck operation.

Trucks may pull up to both sides of the island at the same time. This tends to reduce delays and line-ups when several trucks arrive or depart at the same time.

When a truck comes in off its route

An ice cream truck, left, and a retail milk truck, right, being serviced at the island control platform at the main plant of Foremost Dairies, Inc., at Jacksonville, Fla. Both trucks are Whites. The one on the right is a White Horse, which has an air-cooled engine on the rear axle. Its gasoline tank is being filled from the front at the point where the conventional truck gets its water, as the truck at the left. Note floodlight at upper right below roof of open-sided truck-repair shop. The desk on the platform on which the truck control sheet is kept is directly behind the driver at the left.



at night, an attendant on the island serves it with gas, oil and water at one point and marks the quantities of gas and oil on the control sheet, together with the time of arrival of the vehicle and the speedometer mileage reading.

In the morning, the driver signs his name opposite his truck number on the control sheet and records his time of departure and the speedometer reading. This provides a complete record of the truck's operation.

Daily Check Made

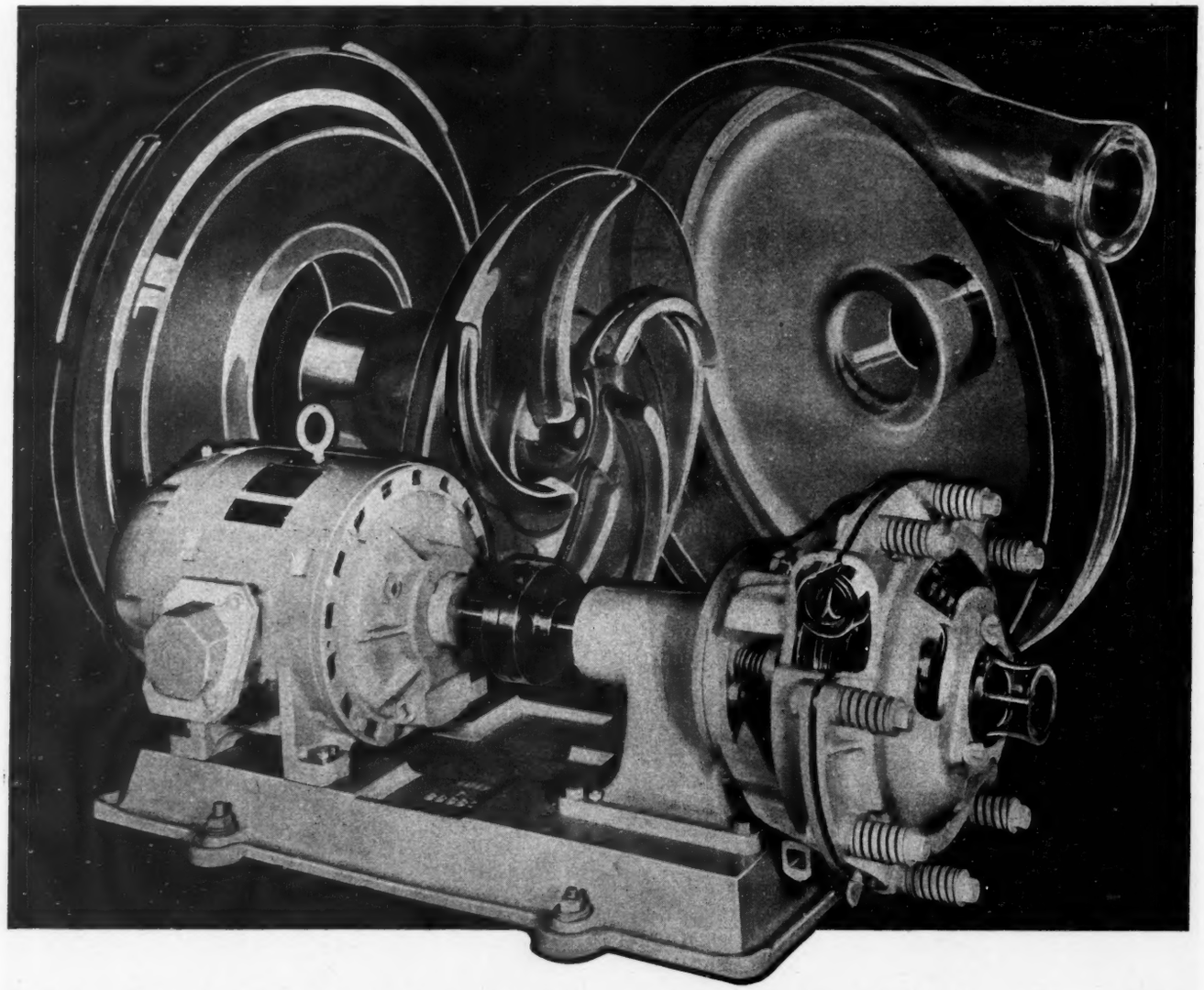
Each day a clerk totals the control sheet to obtain a daily check on gasoline and oil to prevent shortages. Subsequent totaling of the daily sheets by weeks or months gives every required control of truck operation, including actual gasoline and oil consumption per mile, total mileage and route time and mileage. All of these data are required in the company's wartime economy program.

In a subsequent issue FOOD INDUSTRIES *will tell how the operating data obtained at this control island were utilized in planning for more efficiency in truck operations.*—THE EDITORS.

Details of the island control platform from which Foremost Dairies, Inc., controls the operations of its fleet of ice cream and retail milk trucks at its main Jacksonville, Fla., plant.

The Nash *Pump of Glass*

is *transparent*, permitting constant check of color, sedimentation, etc.



Casing and moving-element of this remarkable centrifugal pump are of "PYREX" brand heat and shock resisting glass. Perfect transparency permits constant observation of the interior of this pump and the material being handled. • The balanced glass impeller, rotating at 1760 R. P. M., delivers 6000 gallons of acid or other liquid per hour against a 65 foot head. • Hot acids, or brine cooled liquids may be pumped with equal facility. If cleaning is necessary, pump can be taken apart in a few moments. Reassembly is as quick, and adjustment is almost automatic. • There are many more exciting facts about this successful non-metallic pump. Write for your copy of Bulletin D-313 now.

NASH ENGINEERING COMPANY

208 WILSON POINT ROAD, SO. NORWALK, CONN.

NEW PACKAGES & PRODUCTS

Dispenser For Toast

PEPPERIDGE FARM melba toast, processed in Fairfield, Conn., is appearing on grocers' shelves in a new display dispenser, designed by Robert Gair Co., Inc. Individual cartons for both white and whole-wheat melba toast were redesigned to give emphasis to the end panels and provide easy identification when sold from the dispenser. The dispenser has apertures at the back which enable the dealer to push out the individual packages, or they can be pulled out from the front.

Metal-saving Bag

A NEW, specially constructed paper bag, lined with moistureproof cellophane, is being adopted by coffee packers to keep their product in fresh condition. The durable container, fabricated by Du Pont de Nemours, has already been adopted by Ellis Importing Co., Philadelphia, Keonig Coffee Co., Cincinnati, Ohio, and scores of other packers.

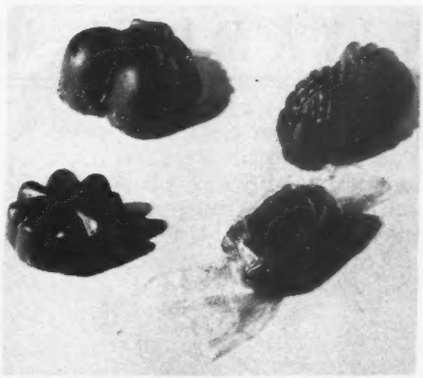
The moistureproof, odor-proof cellophane liner requires no critical material and no shortage is anticipated by Du Pont. The new bags are easily filled and they take up less storage space than tin and save shipping weight. The can design is carried out on the bags, assuring consumer recognition and acceptance.

As an extra precaution, some coffee packers "wash" the bags with carbon dioxide before filling to dispel the oxygen. This tends to check oxidation and protect the flavor. The cellophane-lined bag can be used to replace metal containers for several dry or powdered foods needing moisture protection, such as cocoa and cookies.

Sweet Potato Candy

A NEW confection which elicited comment at the National Confectioners Association convention was the "Yam-Yum Nougat," made from sweet potatoes. The formula of this and other unique candies displayed by the Nulomoline Co., New York, N. Y., was developed to conform to available domestic materials, using Nulomoline as a sweetening and preserving agent. A minimum of granulated sugar is required in these formulas which stretch the sweetening value of allotments.

The chewy-type Yam-Yum, pictured above in a cellophane wrapper with twisted ends, is made from ground sweet potatoes, corn sirup and high-grade molasses. Also illustrated is "Sweet Potato Tennessee Delight" candy molded in fruit forms.



Seasoned Salt

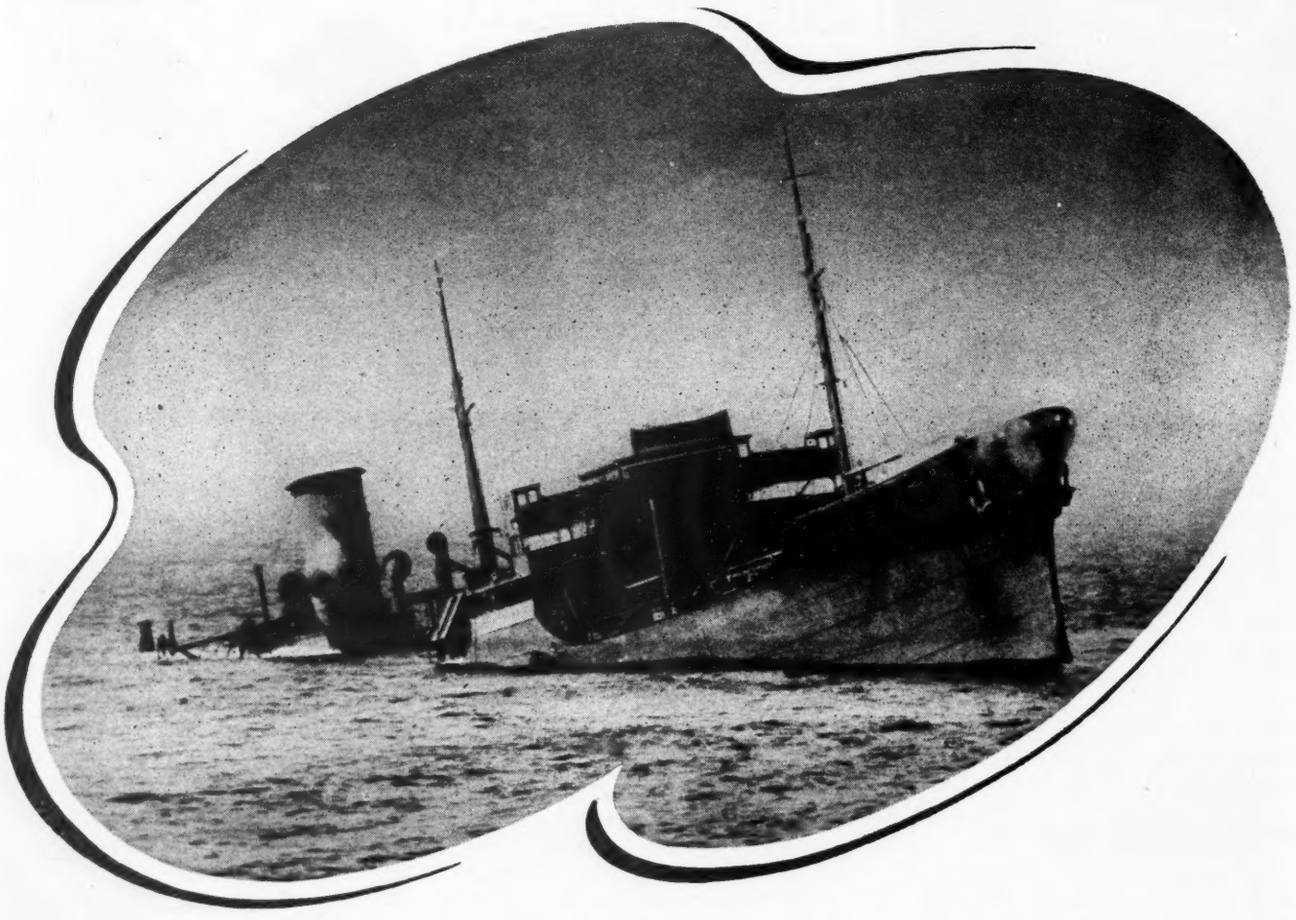
"LAWRY'S Original Seasoned Salt" is a blend of spices, herbs and seasonings perfected by Lawry's Products, Inc., Los Angeles, in its Beverly Hills restaurant. Intended for table use to supplement or replace the salt and pepper shakers, the product stimulates the appetite and enhances the flavor of meats, eggs, fish, cheese, salads, soups, gravies and other foods.

Ingredients of the seasoned salt are rice flour and cornstarch artificially flavored with monosodium glutamate, sugar, spices, herbs and flavoring.

Patrons of Lawry's restaurant in Beverly Hills gave the product a national reputation and the 5-oz. lithographed tin with the shaker top now has distribution throughout the country.

AS TRANSPORTATION GROWS ACUTE

VITAMINS GROW MORE IMPORTANT



SHIPS go down—tires blow out—freight trains are delayed. Every day the problem of transporting the tremendous quantities of food needed for 200,000,000 people engaged in total war becomes more acute!

But, this food must go through to the fighting forces all over the world, as well as to the home front. To get it through and at the same time safeguard against the vitamin deficiencies encountered even before the war, each cubic foot of space must carry new high vitamin values to help win the war.

The quickest, most direct and cheapest way to increase vitamin content with a minute increase in weight and bulk is through the addition of pure vitamin substances—thiamine (vitamin B_1), niacin and ascorbic acid (vitamin C). For example, to add the full daily vitamin B_1 requirement of 15,750 active adults takes but a single ounce of thiamine! To help solve your enrichment problems, come to the company which manufactures synthetic vitamins by the tons. Our Research Department stands ready and eager to help you.

VITAMIN DIVISION · HOFFMANN-LA ROCHE, INC. · ROCHE PARK · NUTLEY, N. J.

FOOD INDUSTRY NEWS

GENERAL NEWS • TRENDS • MEN • JOBS • COMPANIES • AUGUST, 1942

Food Processing Ruled Necessary War Employment

Manpower regulations give some advantage to food plants in holding workers

Two considerations determine whether a food plant worker will be called for military service or not. Of slightly greater importance is his marital status. Of slightly lesser influence is his necessity for carrying out the food processing at the plant where he works.

Certain essential manufacturing activities have been determined as necessary for the war effort by the War Manpower Commission. Prominent in this list are, of course, the making of guns, planes, and other fighting equipment, the building of ships, and such direct war services. In the list is also food processing, recognized clearly as just as essential for maintenance of the military effort as the making of the fighting equipment. This does not mean that every type of food processing, nor every job in a food processing plant; but it does give a definite recognition to the broad group of essential food manufacturing establishments.

In the Congressional act regarding selective service, which took effect July 1, the marital status of a man determines primarily the probability of his being called for combatant service.

Within each group there remains then the distinction based upon the necessity of the individual in the job which he is doing. Thus, the man who would be very difficult to replace because he is highly skilled and requires some years of training can be held, whereas others equally useful will go because replacement personnel can be prepared to do the job acceptably in the matter of a few months.

Estimates of tremendous increases in personnel requirement for the armed forces, for munition manufacturing, and for other special war services are being announced in Washington. Whether one takes them as anything more than sincere guesses, it is inevitable that the increased urgency of personnel planning must be recognized for every type of food establishment. The Army is even planning to take those who have been classified as 4-F, permanently disqualified for combatant service, and putting them in their Specialists Corps.

About the only persons for whom some division of Uncle Sam's organization is not seeking enlistment at the moment are the able-bodied women. The feminine contingents of Army and Navy are so small that industry will undoubtedly have first call on women workers. Second in probable availability for industry will be men above forty-five years.

These principles have so well crystallized that they can safely be taken as determining employment policies probably for the duration.

WPB Is Investigating Compliance by Canners

A QUESTIONNAIRE survey of the canning industry is being made by the Compliance Branch of WPB to determine whether the regulations of the various orders issued by the director of industry operations have been carried out. Of particular interest is the degree of compliance with the tin and terne plate and repair and maintenance orders, and orders M-86 and M-86-a that require stated percentages of the packs of certain foods to be set aside for the armed services.

Violators of the regulations that are disclosed by the survey are subject to criminal action if the violation occurred after the passage of the second war powers act the last week in March. Violations prior to the passage of the act are subject only to economic penalties such as being deprived of priority assistance or being prohibited from obtaining materials subject to allocation.

Canned Shrimp Standards

FSA PROMULGATION of standards for fill of container for canned shrimp was published in the July 2 issue of the *Federal Register*, which also contained amended regulations for the inspection of canned shrimp under the Sea Food Amendment.

The FSA Standards, which apply to wet pack shrimp and dry pack shrimp in nontransparent containers, became effective August 1, 1942.

Wide World

NUTS SPEED WAR PLANE PRODUCTION

A plastic material called "nut bread" is used for dies and drill jigs at the plant of Vega Aircraft Corp. and is credited with facilitating airplane production. The plastic is made by mixing walnut shell flour with resin and other materials. Here the walnuts are being ground. Then a bread mixer is used to combine the ingredients and a cookie oven for baking the product.

Pickle Stocks Held for Army

Packers set aside 30 percent of salt stock. Wartime troubles discussed at meeting

A PLEDGE to hold 30 percent of their entire salt stock for government purchase was made by members of National Pickle Packers Association at the mid-year meeting in Chicago, June 24. The allocation includes salt stock carryover on July 1 as well as subsequent intake, whether bought directly from farmers or others, and was made voluntarily to assure adequate supply of pickles to the armed forces. Should Quartermaster purchases specify 25 to 100 count per gallon sizes, practically the entire anticipated 1942 crop of those sizes will be allocated.

In spite of heavy purchases to date by the government, the inventory of salt stock and dills on hand on June 1 was estimated to be 2,835,606 bu., as compared with less than 2,250,000 bu. on June 1, 1941, and with 7,418,000 bu. on Oct. 1, 1941.

Prospective crop reports from all parts of the United States indicate a loss of about 30 percent of the first planting of contracted acreage because of excessive rains and cool weather. The percentage of replanting is doubtful although the full amount of seed for replanting is being given out. Continuance of cool wet weather, the late date, shortage of farm labor and farmer disinterest are factors in the replanting probabilities. In general, the acreage contracted runs from 100 to 115 percent of the 1941 acreage harvested.

The outlook for planting and picking labor is more promising than that for plant indoor labor. However, much of the acreage represents new growers who are not as dependable when it comes to taking care of plants and picking systematically as are experienced growers. An increase in tonnage of large cucumbers and a decrease in tonnage of preferred sizes are anticipated.

Importance of improved plant sanitation was stressed by President Olney Brown with comments that progress is being made throughout the country. Marked improvement was reported for several companies who previously have been negligent or indifferent to good sanitation practices.

The wartime problems which are particularly troublesome to the pickle industry are:

1. Slowness with which use of standardized Economy glass containers is being made possible even though members of the Association voted for mandatory limitations of number of glass container sizes during the January meeting.
2. Confusion with respect to rubber closure rings and seals.
3. Compliance with OPA price ceilings in the face of rising cucumber and labor costs and increased taxes and material costs.
4. Transportation and storage facility shortages.
5. Lack of standardization of specifications on pickles for the Army as compared with those for the Navy.

Appointment of George Hathway as civilian buyer in the Chicago Quartermaster Depot to handle all purchasing of pickles for the armed forces is expected to result in correction of the differences in the specifications.

More Soda Ash Discovered

FOOD PROCESSORS who have feared a shortage of glass containers because the necessary soda ash for the manufacture of glass was not to be had may now rest easy. In mid-July the Bureau of Mines announced the discovery of a large deposit of natural sodium carbonate which places the United States in a very favorable position to supply its wartime needs of soda ash. The new deposit is in Wyoming and should relieve any soda ash shortage on the Pacific coast when facilities for its recovery have been installed.

Courtesy Timely Ideas

LARDER BECOMES ARSENAL ALSO

Not content with helping America to be the larder of the democracies, Beech-Nut Packing Co. is now contributing to the country's production as an arsenal for the United Nations. In an area which was a store room, the company utilizes machine tools, formerly employed in maintenance work, to produce metal parts. Beech-Nut sent some men to Defense Schools for three months of training for the new work. And additional men are being trained to create a reservoir of skilled workmen. Here is an outstanding example of extra contribution that food processors can make to the production for victory program.

Macaroni Makers Plan War Efforts

Budget for research tripled, number of varieties reduced and packages simplified

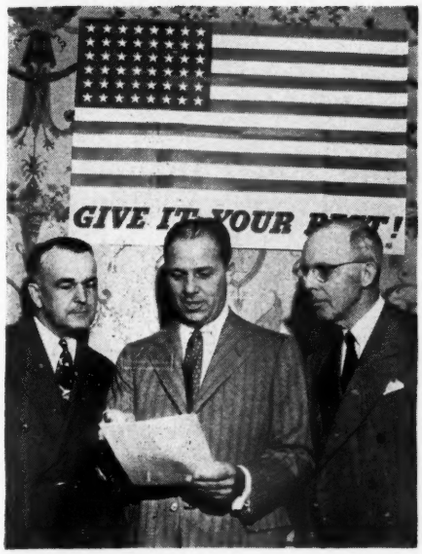
WITH the decision that its present setup is adequate, the National Macaroni Manufacturers Association stressed wartime problems and activities during its 39th annual convention at Chicago, June 22 and 23. The budget for the director of research was tripled and an expense fund for the president was established to cover expanded activities to help meet wartime conditions. And a resolution was passed recommending more frequent regional meetings.

An immediate step taken to meet wartime restrictions is a 30 percent reduction in macaroni varieties by Italian style manufacturers to relieve the demand for dies involving use of strategic metals, particularly copper. American style items have not been numerous and are already standardized except for size of package. Action on package simplification is progressing on the basis of action taken during the January meeting in cooperation with W.P.B.

In arriving at the dimensions for the various packages, 20 percent tolerance for slack fill is under consideration, with an additional $\frac{1}{2}$-in. margin in package length for large products.

Relief from price ceilings was asked in a resolution stating that OPA ceilings do not apply to the principal ingredients used, particularly semolina and farina.

All officers were reelected by the Association. They are: President, C. W. Wolfe, Megs Macaroni Co., Harrisburg, Pa.; vice-president, A. I. Grass, I. J. Grass Noodle Co., Chicago, Ill.;



ORGANIZE SALVAGE CAMPAIGN

The dairy and ice cream industries of greater New York have organized for the industrial salvage campaign. Left to right, Theodore G. Montague, president of Borden Co. and chairman of the executive committee of the dairy industries industrial salvage committee; R. Merrill Decker, regional director, industrial salvage section, bureau of industrial conservation, WPB; and Rolland J. Hamilton, American Radiator & Standard Sanitary Corp., and chairman of the Industrial Salvage Committee for Greater New York.

secretary-treasurer, M. J. Donna, Braidswood, Ill.; director of research, B. R. Jacobs, Washington, D. C.; advisor, Joseph J. Cuneo, La Premiata Macaroni Corp., Connellsville, Pa.

Baker Tests Wooden Tires

Dugan has been trying them for two months on electric trucks. Satisfactory tread a problem

THREAT of civilian rubber tire requisition to meet the needs of our armed forces has intensified the testing of wooden tires on the bakery route trucks of Dugan Brothers of New Jersey, Inc., Newark, N. J., and also on a popular make of passenger car in conjunction with a large national tire distributor.

To date, wooden tires have been tested for over two months on several of the Dugan electric trucks operating on routes of from 15 to 30 miles in level territory. Running at not over 18 to 20 miles per hour, the drivers report very little difference in operation.

To date the passenger car has been run 1,500 miles on various types of wooden wheels without damage to the car parts.

According to G. K. Batt, vice-president of the Dugan company, wooden

Our first obligation in the present emergency is to supply machines for our armed forces . . . The second is to assist manufacturers who require wrapping machines for civilian production.

So to aid those who cannot obtain high priority ratings for new wrapping machines, we are endeavoring to locate used machines of our manufacture, which will meet their needs. Because of our broad and intimate knowledge of the field, we frequently can find—or already know of—plants having idle machines which can be sold to other manufacturers . . . One well-known company recently secured ten machines in this way. Another company bought two machines from a manufacturer in an entirely different line.

We do not buy or sell such machines, but merely supply information as to where they can be obtained. Then the interested parties should get approval from Washington to carry out the exchange.

Our machines are extremely versatile and most models are suited to several types of wrapping material. They can, therefore, be adapted to the needs of new users with little or no alteration.

If you can benefit by this service, send us full information regarding the *type of machine* or *style of wrapping* you require. We'll endeavor to find the right machine for you.

We suggest that you write our nearest office.

PACKAGE MACHINERY COMPANY

SPRINGFIELD, MASSACHUSETTS

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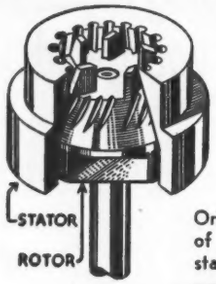
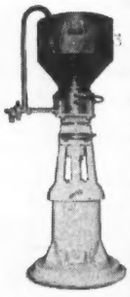
PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

PLUS Your Product
...AND SHOW A GREATER PROFIT!



Original design of rotor and stator in **EPPENBACH COLLOIDAL MILL** assures more efficient triple action.



AMAZING RESULTS have been achieved with the Eppenbach Colloidal Mills. Products, as wide apart as emulsions, serums, lipsticks, rubber compounds, have acquired new, improved qualities, because the Eppenbach is so far ahead in its triple action.

It's more powerful, the mixing turbines break liquids more violently. Clearances can be so finely adjusted, they seem practically closed. The teeth in the rotor and stator shear the materials mechanically—then the smooth surfaces hydraulically shear to any required particle size.

Perfect control is assured. No air is sucked in. Micrometric adjustments are made without stopping. Water jackets provide right temperatures. Rotor is only moving part—and it's conically shaped to take up wear. Self-cleaning, simple, rugged. *Write us.*

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PROCESSING EQUIPMENT FOR OVER 29 YEARS
45-10 Vernon Blvd., Long Island City, N. Y.

wheels without treads have stood up for between 300 and 500 miles. This is not enough for regular wheel replacement but definitely offers at least a partial solution for spare-tire replacements.

The principal problem to date in the wooden tire tests has been to find a proper tread which will not break down on the edges and flatten out on the circumference.

The latest tread used is an imitation leather made up in tread blocks to form a circumference. To take additional shock off the chassis, heavy fillers of felt have been placed between the steel tire rim and the inner circumference of the wooden wheel.

WPB Realigned For Production

Problem now one of scheduling output in accordance with the grand strategy

BROADLY speaking, the nation's war effort is passing from one phase into another. This event was marked last month by a reshaping of the structure of the War Production Board. The nation's war plant has been built, the equipment installed. The problem facing WPB has become one of scheduling production in accordance with the grand strategy and the limits imposed by the raw materials supply and other factors and seeing that the schedule is carried out.

In the new setup there is a sharper demarcation between the top of the organization charged with laying down the broad policies and the operating portions—the industry and commodity branches—than there has been previously. At the operating level, the branches in most cases continue as before but under the new title of "division." Thus you will soon hear about the Food Division, which will be the Food Branch under a new name with Douglas Townson remaining chief. The Food Division will have all the authority it formerly had.

At the division level some changes have already taken place. The Food Processing Machinery Section has been transferred lock, stock and barrel to the General Industrial Machinery Branch.

(See chart on page 40 for details of new WPB organization.)

Fruit Cocktail Standards

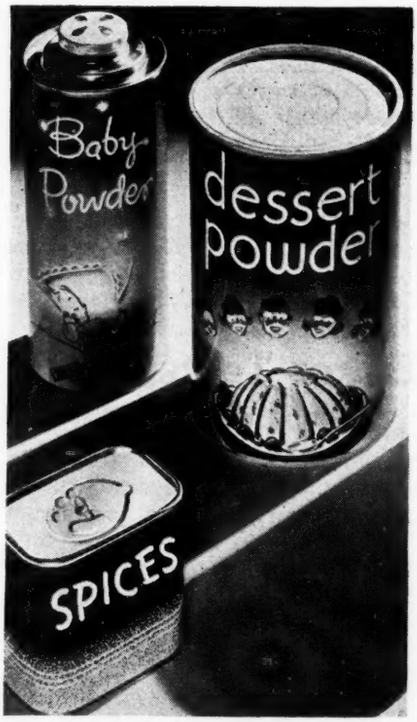
PROPOSED Federal standards for canned fruit cocktail, cocktail fruits and canned fruits for cocktail were issued on July 12 by the Food and Drug Administration. The standards of identity, quality and fill of container were published in the *Federal Register* of July 16, but no date has yet been set when the standards will become effective.

Some AM Purchase Programs Revised

THE Department of Agriculture's program for purchase of solid pack pie apricots and canned red sour cherries was altered somewhat, and AMA purchase of some pork items was temporarily discontinued, in recent announcements.

Under the amended program for apricot purchase, canners are asked to submit bids to AMA for 840,000 cases, required for Lease-Lend shipment. Bids will be accepted only from canners who agree to pay growers at least $60 per ton for the fruit—orchard-run as to size—delivered at the canning plant and used in packing the deliveries made to AMA.

AMA has offered to purchase after March 1, 1943, canned cherries from processors at $1.50 per dozen for No. 2 size cans and $7.50 per dozen for No. 10



NEW CONTAINER DEVELOPED

By a new method of fabricating fiberboard in the same manner as tin plate, American Can Co. plans to manufacture fiber containers on the equipment formerly used for making tin cans. The fiber, cut to sheets of tin plate size, lithographed on the regular presses formerly used on tin plate, will then be sheared and formed into bodies. The ends will be seamed or crimped onto the containers in a rolled seam operation similar to that used in making tin cans. The company plans to use both black plate and fiber ends on the fiber containers designed for food products.

sizes for water pack of U. S. Grade C (Standards) or better, less 5 percent allowed for brokerage or cash discounts. Purchases will be made only from canners who have paid growers at least 5 cents per pound for the raw fruit.

To allow greater quantities of pork meats for domestic consumption, AMA has temporarily discontinued purchase of cured and smoked bacon, cured and smoked regular and skinned hams, and dry salt American cut bellies. This move was possible because Lease-Lend shipments in recent months were of sufficient volume to meet requirements.

OPA Lifts Ceilings On Fruits, Vegetables

OPA last month announced that measures would be taken to raise retail prices of 1942 pack canned and dried fruits by as much as 15 percent, and possibly more. And a later announcement indicated that similar action would be taken with respect to frozen fruits and vegetables.

For canned foods a price formula has been worked out. Briefly, it is as follows:

To determine his maximum f.o.b. factory price, each canner is instructed to calculate the exact average price charged per dozen, f.o.b. factory, on spot sales of each kind, variety, style and can size of fruit and berries during the first 60 days after he began to pack each fruit in 1941. To this average he adds 10 percent to cover increased costs other than raw materials. He then adds the difference between the weighted average cost of raw material in 1941, delivered at the factory, and the weighted average cost of raw material delivered at the factory this year. This latter amount, however, must not exceed the difference between the national average price for that raw material last season, as published by the Department of Agriculture, and the highest applicable price for the particular commodity under Section 3 (the farm price section) of the Emergency Price Control Act of 1942.

Processors May Get More Sugar

OPA permits state directors to grant increased allotments because of crop increases

OPA on July 13 authorized state directors to grant increased allotments of sugar to food manufacturers whenever in their judgment it is necessary to avoid waste of fresh fruits and vegetables. But before granting petitions, the state directors of OPA were advised to make certain that the sugar content of a product cannot be reduced. And they were also told to consider the possibility of other uses

These "EXTRAS" Cost You Nothing... AND MAY SAVE YOU MONEY

COMPLETE SERVICE
PERIODIC INSPECTIONS
LIABILITY INSURANCE
ALL SAFETY PRECAUTIONS
MOST EFFICIENT METHOD
BETTER RESULTS

From an Industrial Fumigation Engineer—located near you

TURN your pest control problems over to an Industrial Fumigation Engineer—and forget them!

He will assume complete charge—taking full responsibility.

Qualified by specialized technical training and long experience, the Industrial Fumigation Engineer knows insects and rodents; knows their habits, life cycles and how to control them under all conditions.

As part of his service, he supplies all materials; he recommends the type and frequency of fumigation for best results in your plant; and he sees the job through. His workmen are schooled in safeguarding your employees and merchandise. And he carries Fumigation Liability Insurance.

Write us and we will gladly ask the Industrial Fumigation Engineer nearest you to call, make a survey of your conditions and needs, and submit his findings. This involves no expenditure on your part.

Liquid HCN is the fumigant of choice with Industrial Fumigation Engineers throughout the country. Its remarkable killing power, cleanliness in use, and surprisingly low cost permit complete pest control with greatest economy. Write for full information on the advantages to you of Liquid HCN.

INFESTATION COMPLAINTS ENDED, COSTS REDUCED BY 50 PERCENT

● By calling in the specialized services of an Industrial Fumigation Engineer, a leading meat packing plant eliminated all complaints of infestation. In addition, the plant manager was able to show a saving of over 50 percent in fumigation costs. Well-planned use of Liquid HCN was responsible for this outstanding job.

American Cyanamid & Chemical Corporation
INSECTICIDE DEPARTMENT
30 ROCKEFELLER PLAZA • NEW YORK, N. Y.
KANSAS CITY, MO. • AZUSA, CALIF.

SEAMLESS STEEL CONTAINERS

HACKNEY CONSTRUCTION *Assures* LONGER LIFE

THERE isn't a weld or a joint in the entire construction of Hackney Seamless Steel Containers—they're cold drawn to shape. Strong and durable, they stand up under the toughest use. Hackney containers are proving their advantages over ordinary containers in inter-departmental handling of raw products during the manufacturing process . . . in storage of materials . . . throughout the food plant. They are used for holding food stuffs, liquids, chemicals, ice, etc., as well as food scraps. They are furnished in various capacities. These and other advantages have won the preference of many food manufacturers for Hackney steel containers.

Hackney engineers have an intimate knowledge of all types of metals—a complete understanding of users' requirements. Facilities and manufacturing equipment are completely modern. Today, metals for other than direct war uses are more difficult to obtain, but there is no interruption of Hackney skill, knowledge, imagination or research. These are continuing. They are your assurance of the continued superiority of Hackney containers.

Hackney MILWAUKEE

PRESSED STEEL TANK COMPANY

General Offices & Plant:
1457 South 66th Street
Milwaukee, Wisconsin

Containers for Gases, Liquids and Solids

of the fresh fruits and vegetables, in which additional sugar is not necessary.

This relaxing of sugar restrictions was made advisable because of the greatly increased acreage planted to meet wartime needs.

Higher Cream Quality Urged

Transportation problems also discussed at National Cream Quality Program meeting

WITH transportation complicated by war conditions, more attention to the details of sanitation and temperature is "fundamental—even vital," according to M. E. Parker, of the American Butter Institute Research Committee, speaking at the first annual meeting of the National Cream Quality Program at Chicago, June 23.

Details which contribute to cream quality are the use of properly cleaned utensils, container size consistent with cream volume, protection of cream from dust contamination, grading and segregation of cream, and reduction in the time lag from buyer to churn.

Objectives of the National Cream Quality Program include the buying of all cream on a grade basis, adoption of standard containers and establishment of practices that assure clean and well-maintained butter plants and buying stations. The development of an effective producer education program is resulting in an increased production of No. 1 quality cream.

E. F. Scott, of the American Butter Institute Traffic Committee, pointed out that expected revisions in ODT regulations would remove some of the difficulties of compliance, but the industry's problems of transportation are complicated because savings in mileage must be made without increasing the time in transit of the cream. The Farm Credit Administration, through its Research and Service Division, has released a report on local hauling and procurement of milk and cream, which includes the statement that repeated research studies have shown clearly that this hauling could be done equally well with fewer trucks, with less mileage traveled, and at a lower cost to producers. Mr. Scott said that both ODT and FCA have suggested zoning, the one of the territory of distribution and the other of procurement territories. The butter industry should go to work on this problem, now.

No plan will work in all cases. An effort should be made to get the creameries to agree on uniform buying days, consolidation of the hauling job, and routing trucks to make possible more direct travel. Small trucks can perhaps

"Pee—eep!"

be used to connect with larger trucks or trains, so as to get the cream to the churn sooner and in better condition. Coordinated truck and rail shipment should be considered. After such plans are worked out, concurrence of the interested truckers must be obtained. The plan, when ready, must be submitted to WPB and by them to ODT for clearance with the Department of Justice. Any such plan submitted must be based on an improvement in quality and a substantial saving in rubber mileage.

Waxy Starch From Sorghum

Waxy sorghum is being grown to replace imported root starch in adhesives and food products

RECENT tests indicate that waxy sorghums may be used in part to substitute for imported root starches formerly used in food, in the textile industry, and for making adhesives, including those used on stamps and envelopes, reports the Department of Agriculture.

Preliminary tests have demonstrated that starch with certain of the desired characteristics of tapioca and other root starches can be extracted from the waxy sorghums. Tests are now being made by several manufacturers of foods, adhesives and other starch products, and by chemists of the Department and State Experimental stations.

There are certain difficulties in applying the usual methods to extraction and purification, and, unless methods of manufacture and the quality of the waxy varieties are improved, the extraction of starch from sorghum seed is likely to be expensive. However, Department officials believe that this

source may help meet immediate requirements for waxy starch during the present emergency.

Waxy sorghum is not a new development, as sorghum varieties having waxy seeds have been grown in the United States for sirup, forage, or grain since 1854. It is estimated that the production of these varieties will exceed 200,000 acres in 1942. The Bureau of Plant Industry and cooperating State agricultural experiment stations have been testing and breeding waxy sorghums for feed production for many years.

Beef Price Regulation Revised by the OPA

SEVERAL changes in Maximum Price Regulation No. 169 (beef and veal carcasses and wholesale cuts) were announced on July 8 by OPA. There are eleven salient features in the amendment:

1. Presentation of a formula to prevent evasion of the pricing sections of the regulation through the practice of custom slaughtering.
2. In computing maximum prices for fores and hinds separately, each seller now is required to adjust those prices so as to prevent the total price received from exceeding the maximum permitted for his sale of a whole carcass of such grade.
3. Where a seller did not merchandise a particular quarter or saddle from which wholesale cuts were derived, during the base period, his maximum price for wholesale cuts derived from these are now to be computed on the same 30 percent formula applicable to the determination of carcass maximum prices.
4. Maximum prices from wholesale cuts not derived from a quarter also may be determined by the 30 percent formula.
5. The method of car route pricing has been revised to provide for a basic price at the seller's plant, rather than at the farthest zone.
6. Persons whose business during the base period was more than 50 percent kosher slaughtering, but who also do some regular slaughtering at a different place in the same locality, are required to compute different price ceilings for such different places of business.
7. A new definition of car route has been made.
8. A new definition of carload sale has been made.
9. Market area has been redefined.
10. Sales to the armed forces and FSCC are subject to the regulations.
11. Provision is made for adjustment of maximum selling prices in certain cases where they cause a hardship to sellers.

SCHEDULE OF EVENTS

SEPTEMBER

Sept. 1–Nov. 6—Siebel Institute of Technology, 53rd course in Baking and Milling Technology, Chicago, Ill.
Sept. 7–11—103rd meeting, Agricultural and Food Division, American Chemical Society, Memphis, Tenn.
Sept. 16–18—American Fisheries Society, New Orleans, La.

THEY'RE TOUGH . . .
THESE 125 lb. GATE VALVES

Bronze Wedge Disc Gate Non-rising Stem

Bronze Double Disc Gate Rising Stem

And they're proving it in countless plants in all industries. The extra strength built into these tough bronze valves comes in good stead in meeting the severe demands of continuous operation. Now more than ever they are proving to their users that it pays in the end to buy good valves first.

Figs. 2125 and 2129 are outstanding examples of the ruggedness and dependability that are inherent qualities in all Lunkenheimer products.

Since virtually all materials used in the manufacture of valves are on the list of critical materials, valve users are urged to furnish the highest possible preference ratings and proper "end use" Allocation Classification Symbols on their orders. This will be of mutual helpfulness.

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EXPORT DEPT. 318-322 HUDSON ST., NEW YORK

LUNKENHEIMER VALVES

War Production Board Orders

Air Conditioning, Refrigeration—Amendment No. 1 to Preference Order P-126 extends to September 30 the high preference ratings for deliveries of materials needed for emergency repairs to commercial air conditioning and refrigeration equipment. The original order assigned ratings from A-1-a to A-8 for various types of emergency repair service, permitting suppliers of designated Emergency Service Agencies to use the ratings.

Chlorine—WPB issued Supplementary Order M-19-a, effective July 6, restricting deliveries of high test calcium hypochlorite or chloride of lime by producers unless authorized by the Director of Industry Operations. This government agency will issue each month to producers specific directions covering all deliveries which may be made during the month.

Cocoa Beans—The critical shipping situation has necessitated a 14 percent reduction from the original quota of cocoa beans that could be processed during the present quarter, in Supplementary Order M-145-b, effective July 1. The new order reduced the quota in this quarter and for subsequent quarters unless changed, to 60 percent of the base period.

Cloves—Monthly clove quotas for food processors, manufacturers of medicines and clove packers were increased by one-third, and for other manufacturers they were doubled, in Amendment No. 1 to Supplementary Order M-127-a. The increases, result of larger supplies of cloves built up by greater imports during recent months, will make possible a quota for any industrial receiver of 100 percent of the average monthly amount he received in the corresponding quarter of 1941.

Tea and Coffee—Amendments to Orders M-111 (tea) and M-135 (coffee), issued June 26, will help Federal, state, municipal and county institutions to obtain their requirements of these commodities. Under the Original Order, roasters or packers who served such institutions in 1941, but not in 1942, obtained an extra supply of tea or coffee. Roasters or packers serving these institutions this year, but not in 1941, were not receiving the extra supply needed for delivery to hospitals, asylums, prisons, and so forth. Amendment No. 1 to Order M-111 and Amendment No. 3 to Order M-135 relieve this inequity by requiring tea packers, coffee roasters, and tea and coffee wholesale receivers to change their basis for computing their 1942 monthly quotas, beginning July 1.

Dairy Products Plants—Processors of dairy products have been assigned high preference ratings for maintenance and repair materials, in Amendment No. 2 to Preference Order P-118. The amendment, rushed through to avert spoilage of the existing large milk production, will aid nearly 37,000 processors, making it possible for them to obtain such items as bronze bushings, tinned copper sanitary pipe, nickel alloy sanitary fittings, pump impellers, small brass valves and motor re-windings. Any maintenance and repair needs are now assigned an A-1-j rating. However the Dairy Section of WPB cautions that the distinction between replacement and repair materials is important; replacement orders must receive WPB approval before the original A-3 rating can be applied.

Fruits and Vegetables—Increased percentages of the 1942 pack of specified fruits and vegetables have been set aside for Army, Navy, Lease-Lend and other government agencies by an amendment to Supplementary Order M-86-a, issued June 29. Under the new order larger supplies of all 23 items on the list in the original order, except for asparagus, peaches, carrots and spinach, are to be taken by the government, and pineapple juice has been added to the list. Primary products now affected by the order are fruit cocktail, pears, lima and string beans, sweet corn, peas, tomatoes, tomato catsup, and tomato juice; secondary products are apples, applesauce, apricots, RSP cherries, sweet cherries, pineapple, pineapple juice, fresh prunes, beets and pumpkins. The amendment also orders that, if possible, at least two-thirds of the quota be supplied out of the first preference grade in the largest specified can size, with the grade taking preference over can size in case of conflict.

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UNIFORMS OF REEVES ARMY TWILL CAN TAKE IT!
Uniforms that are neat in appearance and easy to keep clean are essential in the food industry. So specify Reeves famous fabrics for your uniforms.
REEVES ARMY TWILL meets exacting U. S. Government Tests for better wear, longer life, and colorfastness. Its fabric vitality keeps it "in shape" under trying conditions.
For matching shirts, specify GLENGARRIE POPLIN, a durable, stylish fabric in a wide range of colors. Both fabrics are Sanforized * against shrinking.
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See your nearest dealer for uniforms, sport and work clothes made from these famous fabrics, or write for colorful leaflet to:
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NEW YORK CITY

Plastics—Delivery of thermoplastics, only type of plastic not already under government control, has been restricted by General Preference Order M-154, issued June 27. Thermoplastics, now in great demand for war production, have been divided into four classes; Class I has first call on the material after war orders are filled. This class includes essential equipment for transportation, communications, industrial plants and offices, health supplies, food production and distribution, technical and safety uses and housing.

Drum Exterior Coatings—Amendment No. 1 to Conservation Order M-158 restricts use of Class A coatings (tung, oiticica, perilla or dehydrated castor oils, alkyld, phenolic, vinyl, urea or melamine resin, or cellulose esters or ethers) to drums to be used for offshore or export shipment, drums for United States Army, Navy, Coast Guard or Maritime Commission, or where the Class A coating was manufactured on or before July 5. Restrictions were also issued for use of black or clear coatings on the exterior surface of drums.

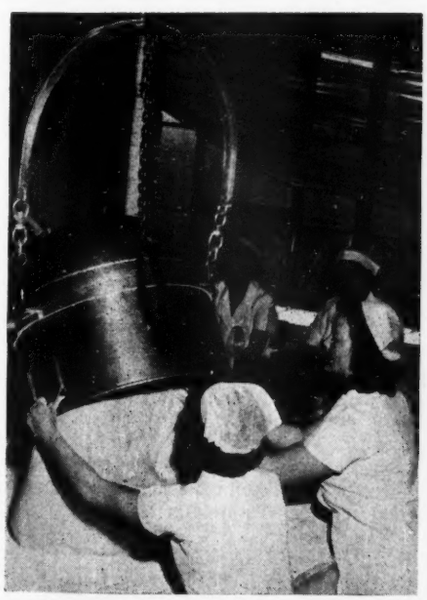
Tin Plate, Terne Plate Cans—Manufacture or use of tin plate or terne plate cans for many chemicals, paints and special products has been prohibited by WPB in a revision of Conservation Order M-81, issued June 27. The revision prohibits the packing of the following products in tin plate or terne plate after October 31: hardened edible oils, hardened or unhardened lard, edible liquid oils, fish fillets, crab meat and shrimp. The revision slightly changes the list of vegetables and foods of

primary importance on which no quantity limitations of cans are placed. Grapefruit and lime concentrate are eliminated from the order; more stringent restrictions are placed on special dietary foods, and definite specifications are listed for orange and lemon concentrates, tomato paste, sauce and catchup, fish and shellfish. Foods of secondary importance affected by the revision are apples, applesauce, berries, grapejuice, grape pulp, citrus pulp and peel, coconuts and olives, various green leafy vegetables, fruit nectars and some meats.

Iron and Steel Conservation—Use of iron and steel was prohibited for a long list of "civilian" articles (those not used in war production) in an amendment to Conservation Order M-126, issued July 13. A manufacturer of items on Supplementary List A was given 30 days to process iron or steel for these purposes, with a limit of 75 percent of the average monthly weight of all metals processed by him in 1941. Items affected by the restrictions are cans or containers under 5 gal. size for bouillon cubes, candy, caviar, coffee, nuts and pet food; lard or vegetable oil tubs (except 5 lb. and over and straps for wood containers); sugar cube dryer trays; cans or containers for candy and coffee.

Wine Standards Raised

HIGHER quality standards for California wine, already said to be the highest in the world, will become effective on September 1. Additional safeguards for the purity of California wines are contained in the standards, which were announced on June 1 by the Bureau of Food and Drug Inspection.



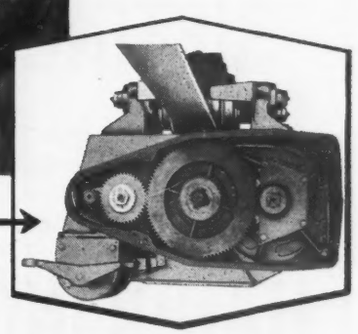
Globe

WOMEN DO ALL THE WORK

Men have been replaced 100 percent by women workers at the plant of Pepperidge Farm Bakery, Fairfield, Conn. Women also drive the delivery trucks. Here an overhead rigging supports a tub of dough so that women can turn the dough out onto the tables without straining their muscles.

Speed WARTIME Food Output WITH R & M ELECTRIC HOISTS!

Here's what Rex W. Perry, president of the Perry Food Products Co., says about this R & M Hoist. "With an absolute minimum in maintenance, our R & M Hoist has always performed perfectly. It is an indispensable aid in speeding production of food for our country and allies."



JUST REMOVE THE COVER →

and the entire hoisting mechanism may be quickly withdrawn! Note the extreme simplicity and precision engineering. Compactness provides utmost headroom and increases lift.

Up-to-the-minute food plants everywhere—of which the Perry Food Products Co. is a typical example—are *increasing* their production of vital foods for home and abroad with R & M Electric Hoists. Why not enlist their capable help to speed *your* lifting and conveying operations?

They give "airline speed" to production lines because they are fast and efficient. Because they handle loads from any angle with perfect balance. Because they're *engineered* to deliver trouble-free, 24-hour service, year in and year out. Because they guarantee the utmost in utility, power and safety—yet require a minimum in overhead space.

Whether you require capacities of 1,000 or 15,000 lbs., there's an R & M Electric Hoist *tailor-made* for the job; and it can be equipped with special trolleys to fit any type of monorail. Where greater distances of movement and high-speed transportation are essential, investigate R & M's complete line of Motor-Driven Trolleys.

The following R & M Food Hoist distributors, or your nearest R & M sales and service office, will be glad to furnish complete details. Or write for factual Bulletins 6161A and 7171A.

SPECIAL R&M FOOD HOIST DISTRIBUTORS

Berlin Chapman Co. ..... Berlin, Wis.	F. H. Langsenkamp Co. ..... Indianapolis
Chisholm-Ryder Co. ..... Niagara Falls	A. K. Robins & Co. ..... Baltimore
Dunkley Co. ..... Kalamazoo, Mich.	Sprague-Sells Corp. ..... Hoopeston, Ill.

ROBBINS & MYERS • Inc.

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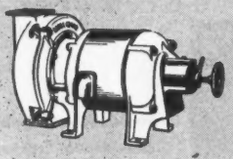
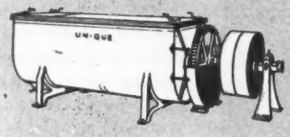
GRINDING

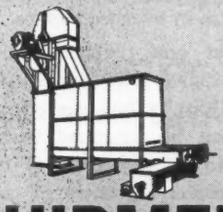


MIXING



SIFTING

HANDLING



EQUIPMENT

Tell our engineers your war production problem. Catalogs and counsel at your service!

ROBINSON

MANUFACTURING COMPANY

WORKS: MUNCY, PA.

30 CHURCH STREET, NEW YORK

CAPITAL VIEWS

TRAIN MORE WOMEN—The pinch on employable personnel for industry is going to come this fall. Every management should begin now to get as many trained women as possible ready for jobs of greater responsibility. Junior personnel must be up-graded. Many who have never worked before regularly must be hired. The job is big and any managemet which waits too long is going to have serious trouble.

EVEN PARAFFIN—Now a shortage of paraffin threatens. This means that many normal packaging methods which were thought secure against war difficulties become real matters of immediate concern. To avoid return to the old open cracker barrel, the packager of foods is going to need new technics using less packaging material per unit of product than ever before thought practical. Larger packages is one of the most promising answers where the package permits effective reclosure in the kitchen. Incidentally, housewives are going to be willing to buy bigger units of foods before long as they realize that only so can they get what they want at all. Promotion of the big package seems logically a part of the job of advertising to be done in the next few months. This applies not only to paraffined containers, but to every other kind also.

HIGHER DEMURRAGE—It is proposed that prohibitive demurrage charges be imposed on those who fail to unload freight cars within a few hours of delivery. The shortage of transportation equipment is going to make imperative complete cooperation of food companies in this matter. Where the shipping and receiving departments are under-manned they must be restaffed to care for arriving goods and for loading empties spotted on the plant siding without any delay.

NEW TAX LAW—Before the Ways and Means Committee had recommended the new tax bill to the House of Representatives, it began to tell about the additional taxes which would have to be passed a little later in the next law. This fact is very important for food plant executives who must program business and finances in relation to the tax bill to be paid next year. It is not now expected that a higher income levy will be enacted after election than was proposed by the House Ways and Means Committee. But it is definitely expected in Washington that some kind of withholding tax, some form of compulsory saving, and some variation of a sales tax will be a part of the Federal program late in 1942 or early in 1943. Additional excise taxes on certain foods would not surprise Washington much either.

RE-USE OF CLOSURES—It remains to be seen how some of the carbonated beverage companies are going to take advantage of returned crown caps which they ask the customer to send back with the empty bottle. Equally uncertain is the feasibility of making new closure materials from scrap or reclaimed cans. But there is no doubt that every such expedient which is at all workable is going to have to be used.

NEW CEILING POLICY—During late June, OPA decided that certain beef and veal ceiling prices should be calculated on a new base. Under the new regulations the ceiling for each grade is set "at the price at or above which a packer sold 30 percent of the particular grade between March 16 and March 28". Thus, firms that happen to have single high peaks of price find their ceiling pushed down close to the level at which other firms were working because their sales prices in the base period had been relatively uniform. This particular revision is one more evidence of the desire by OPA to prevent ceiling prices from becoming a basis for distorted competition between individual companies.

RESERVATION ORDERS – Manufacturers can expect more commandeering of output by Agricultural Marketing Administration, especially for Lease-Lend shipping. Such grabbing of production will be under what are politely called "reservation orders." These direct processors to hold their output subject to government shipping instructions. Oftentimes no stated price is first indicated. There is little precedent yet as to how price negotiations will work out; but in some cases this may be not too pleasantly, it appears. The only comfort some firms have found is that when the government takes their output they at least can get essential packaging materials, such as tin cans.

MEAT GRADES MARKED—In order to enforce ceiling prices on beef and veal, it became necessary in the middle of July for all such meats sold at wholesale to be grade marked according to government specifications of quality. Officials emphasize that this was necessary not only for the housewives protection, but also to guide the retail butcher in proper pricing.

PLENTY OF SUGAR—There remains no doubt in Washington that there is plenty of sugar available, if . . . The if, of course, relates to shipping. As a practical matter, however, OPA intends to cut through red tape wherever necessary to prevent a sugar shortage from causing food spoilage at processing plants which cannot function adequately with previous allotments. If local or state sugar boards interfere and threatens cuts that will cause fruit or vegetable spoilage, an appeal to Washington is likely to bring prompt relief. At least the intentions of Washington are good.

POLICING THE CANNERS—WPB is worried that it is not getting full reports from canners on their seasonal pack of certain goods regarding which official report was required. Inspectors will, therefore, go out soon from the Department of Labor to check on compliance regarding reports, compliance with tin-plate conservation rules, and other matters. Since these folks are from the Wage-Hour Division, they may also look at employee records.

More Quality Control Seen for Apple Plants

THREE important influences have pressed on the apple products industries lately to secure important clean-up in plants.

A general campaign of plant inspection has been going on under the Food and Drug Administration. The Division of Public Contracts of the Labor Department has also been conducting inspections. And some divisions of the Department of Agriculture are assisting, in the hope of making wider use of surplus apple crops for important food products.

The situation was aired, rather unpleasantly for certain jam and jelly makers, in a Congressional committee hearing in Washington. Sweeping charges of unsanitary conditions were made. These were later disclosed to be the result of inspections by the Labor Department through its Division of Public Contracts. That agency had been urged by disgruntled employee organizations to attack their employers The authority rested in the Walsh-Healy law which gives the Public Contracts Division considerable authority in setting up safety and health standards which are involved in the performance of manufacturing under government contracts.

This intensive attack led Commissioner Walter G. Campbell, of the Food and Drug Administration, to come to the defense of the industry. He pointed out that the samples con-

SERVICE MEN GET BABY RUTHS

Curtiss Candy Co., Chicago, is giving a Baby Ruth bar to all men of the armed forces as they embark for foreign service. Each bar carries the message, "Good luck from Curtiss." The picture shows Sergeant Verne Dohle and Yeoman William Demand receiving the first of the bars from Lois Johnson.

A PIONEER THEN—

A LEADER TODAY

IN 1892, in a Virginia valley noted for its vast deposits of pure salt, Mathieson began the construction of the first of three great factories. Over a period of half a century, they were to supply America's growing industries with vital chemicals. Today—fifty years later—the Mathieson plants at Saltville, Va., Niagara Falls, N. Y. and Lake Charles, La., are working twenty-four hours a day to supply the nation's *war* industries with the "raw materials of victory."

This is the over-all picture of a typically American enterprise —The Mathieson Alkali Works. It is a story of growth and progress in chemical research . . . in developing new products . . . and in devising more efficient methods of handling and transporting chemicals.

Among Mathieson's early achievements was the development of the Castner electrolytic cell for producing chlorine and extremely pure caustic soda. The first to make bleaching powder in the United States, Mathieson pioneered the manufacture of synthetic ammonia, liquid chlorine and such outstanding chlorine products as calcium hypochlorite and sodium chlorite. Chlorine, today in great demand for war production, is also safeguarding the health of our fighting men on all fronts as calcium hypochlorite, the *mobile* chlorine carrier.

These are but a few milestones in the fifty years of Mathieson Chemicals. They are tangible evidence of the drive and initiative which have marked Mathieson's rise from modest beginnings to a place of leadership in the field of industrial chemicals.

MATHIESON CHEMICALS

HTH PRODUCTS

CELEBRATING 50 YEARS OF SERVICE TO AMERICAN INDUSTRY AND PUBLIC HEALTH

The Mathieson Alkali Works (Inc.) 60 East 42nd Street, New York, N. Y.

taining "foreign matter" which were presented to the committee were not at all characteristic of the products of the industry. He stated that his inspectors had been visiting plants and were actively cooperating to secure correction of undesirable conditions.

Any units of the industry desiring official cooperation in improving their quality control will be promptly assisted by either the Food and Drug Administration or representatives of the Bureau of Agricultural Chemistry and Engineering.

Lease-Lend Food Totals 5 Billion Lb.

MORE THAN 5,178,000,000 lb. of farm products had been delivered for Lease-Lend shipment up to June 1, the Department of Agriculture reports. The total cost of these products, bought by the Agricultural Marketing Administration and delivered at shipping points since the program began in April, 1941, is approximately $701,000,000.

The leading commodity groups delivered, with cumulative values up to June 1 were: Dairy products and eggs, $224,378,773; meat, fish and fowl, $211,615,575; fruits, vegetables and nuts, $54,854,382; grain and cereal products, $27,714,251; lards, fats and oils, $56,006,163. Purchases of other foodstuffs totaled $5,109,791 and non-food stuffs, $121,378,244.

Dehydrated Beef Wanted

PURCHASES of granular, flaked and powdered dehydrated beef in cans is contemplated by the Agricultural Marketing Administration, it was announced on July 1. Companies offering this type of beef should submit not less than three samples containing not less than 15 lb. For details communicate with the Purchase Branch, Agricultural Marketing Administration, Washington, D. C.

Sugar Disappearance Soared in 1941

OFFICIAL figures for the sugar industry in 1941 were issued by the Sugar Agency of the Agricultural Conservation and Adjustment Administration on July 5, 1942. The report indicates that total deliveries of sugar were 8,098,291 short tons, raw value. This compared with deliveries in 1940 of 6,890,667 tons; in 1939 of 6,867,518 tons; and in 1938 of 6,643,253 tons.

Comparison of 1940 and 1941 deliveries shows a sudden jump of more than 1,207,624 tons. Further examination of these figures shows a jump of 224,265 tons between 1938 and 1939. It is generally conceded that a good part of these increased sugar deliveries went into "stockpiling" rather than into consumption.

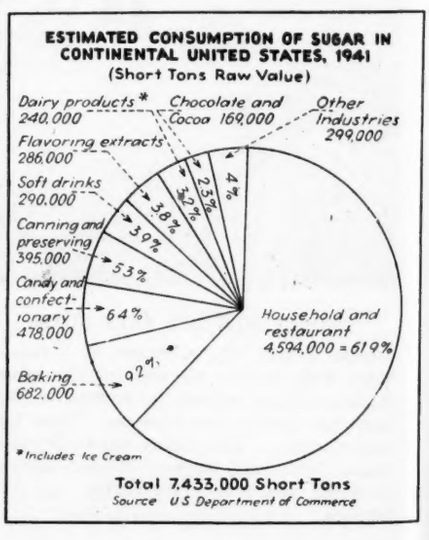
Stocks of sugar in the United States in the hands of sugar refineries, producers and importers on December 31, 1941, are reported by the Bureau of Agricultural Economics to have been 2,137,000 short tons, raw value. To this can safely be added another 1,000,000 tons in consumers' "stock-piles." It is apparent that, when this supply is added to 1942 domestic cane and beet sugar production and to 1942 imports, the carryover that can be expected on December 31 of this year should be considerably bigger than in 1941, when the effect of rationing in reducing normal sugar consumption is taken into account. The *New York Journal of Commerce* has estimated that this carryover will be as much as 2,700,000 tons.

CONSTRUCTION NEWS

	Pending (thousands)	Awarded July (thousands)	Total Awarded 1942 (thousands)
Bakery	.....	.....	$50
Beverages	.....	$150	1,077
Canning and Preserving	$285	40	355
Cold Storage Plants	.....	.....	405
Confectionery	.....	.....	.....
Grain Mill Products	330	40	435
Ice Manufactured	.....	.....	140
Meats and Meat-Products	40	.....	183
Milk Products	140	.....	992
Miscellaneous	2,146	120	3,431
	$2,941	$350	$7,068

Egg Supplies Likely to Increase

PRODUCTION of eggs in the first half of 1942 was about 16 percent above production in the corresponding 1941



EXTRAORDINARY
FOOD MANAGEMENT EXECUTIVE

With Capital Available

A $25,000 calibre man of 40, with a fine reputation of mature and successful experience in consolidating, reorganizing and managing several well known grocery specialty firms.

He has been responsible for sales, advertising, production and general administration for companies ranging in size from 5 to $25,000,000 annual volume. Ten years big league experience makes him thoroughly practiced in modern, scientific management and marketing methods.

In his last position he increased profits for a business consistently in the red, by one-half million dollars in one year and restored sales to the second highest level in ten years.

He is *primarily interested in finding a business* needing management and capital, with established consumer acceptance, which is temporarily adversely affected by war conditions. For such a company an unusually attractive arrangement may be effected. Top notch banking, personal, and business references supplied. Write in confidence for further details to

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420 Lexington Ave., N. Y. C. Tel: LExington 2-8866

period, while consumption decreased slightly. Also, in this six month period, large quantities of eggs were stored for drying in the last half of the year. Because of these facts, it is expected that eggs available for domestic consumption during the last six months of 1942 will be somewhat greater than normal, in spite of the large Lease-Lend purchases that may be expected.

AMA Milk Buying Shifts From Evaporated to Dry

BECAUSE of war developments, purchases of milk for Lease-Lend shipments have largely shifted from evaporated milk to powdered milk. Out of 22,000,000 cases of evaporated milk originally requested by the United Nations for the period from March, 1941, to March, 1942, the Bureau of Agricultural Economics reports that about 14,000,000 cases have been taken and that requirements for the ensuing year are expected to be about 7,000,000 cases. But the AMA has purchased in excess of these figures and is reported to have a reserve of about 25,000,000 cases.

Dried milk requirements for the coming year, in contrast, have risen to about 200,000,000 lb. The AMA is therefore increasing its purchases of milk powder and is also continuing its purchases of evaporated milk for stock-piling purposes.

INDICATORS

Confectionery and competitive chocolate products sales in May, 1942, totaled $24,095,000, as reported to the U. S. Department of Commerce by 190 firms. These sales were 35 percent over sales by the same companies in May, 1941, but 16 percent lower than sales in April, 1942.

Candy sales in 1941, according to the final summary issued by the Department of Commerce, were approximately 2,500,000,000 lb., valued at about $400,000,000, an increase of 11 percent in poundage and 20 percent in value over 1940 sales by the same companies.

Meat production in 1942 is expected to reach the record total of 21,700,000,000 lb., according to the U. S. Department of Agriculture.

Lard production for the 1942-1943 season is expected to be about 3,000,000,000 lb., compared to 2,600,000,000 lb. in the 1941–1942 season.

Meat animals available in the United States in June, 1942, according to National Livestock and Meat Board, exceeded 191,000,000 head, the largest number on record, made up of 74,607,000 cattle, 60,526,000 hogs, and 55,979,000 lambs and sheep. This is an increase of over 11,000,000 above the 1941 figure for June.

Fishery products in cold storage on May 15, 1942, totaled 54,254,979 lb., compared to 41,877,772 lb. a year before and to a five year average of 39,501,000 lb. for the date.

Cherry production, for fresh fruit and packing, is expected to exceed 183,000 tons this year, 13 percent over 1941, and 30 percent above average.

Tomato production this year should be about 7 percent over 1941 output, according to Francis C. Stokes Co.

Butter, creamery, produced in the first five months of 1942 was 732,850,000 lb., 8 percent below production in the same period of last year, but 6.2 percent over the 1931–1940 average for the period.

Butter, creamery, produced in May, 1942, totaled 204,955,000 lb., 5.4 percent below output in May, 1941, but 9.7 percent over the May, 1931–1940, average.

Milk, fluid, daily average sales in May, 1942, were 6.97 percent over the corresponding month of 1941, according to Milk Industry Foundation.

Cheese, American, produced in May, 1942, totaled 114,745,000 lb., the highest monthly output ever recorded. This production was 41.4 percent over that of May, 1941, and 113.6 percent over the May, 1931–1940, average.

Cheese, American, produced in the first five months of 1942 was 387,125,000 lb., 51.3 percent over production in the same period of last year and 119.6 percent over the 1931–1940 average for the period.

Egg production in the first five months of 1942 was 16 percent above production in the corresponding period last year.

Chicks hatched in the first five months of 1942 were more than 911,000,000, an increase of 16 percent above the corresponding month of 1941.

Chicken supplies are expected to be considerably larger during the remainder of 1942 than in the like period of last year, because of the larger number of fowls available for marketing.

Dried skim milk produced in the first five months of 1942 was 267,506,000 lb., an increase of 14 percent over output for the same period a year earlier.

Evaporated milk production for the first five months of this year totaled 1,740,513,000 lb., up 52 percent above production for the corresponding 1941 period.

Evaporated milk production in May, 1942, was reported at 440,682,000 lb., compared to 350,495,000 lb. in May, 1941. This output is 70 percent above the May, 1936–1940, average.

Whole milk, dried, produced in May, 1942, totaled 4,800,000 lb., a 41 percent increase over production in May, 1941, and 107 percent over the average May output in 1936–1940.

Eggs, liquid, packed in May, 1942, totaled 95,233,000 lb., an increase of 63 percent over May, 1941, production.

Eggs, whole, dried, produced in May, 1942, totaled 18,253,869 lb., an increase of 3,715 percent over the 478,450 lb. produced a year earlier.

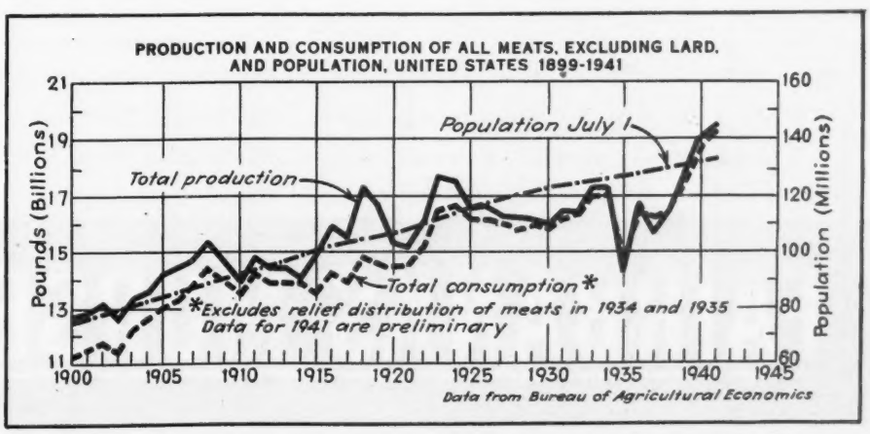
Milk production in June, 1942, was 3 percent above June, 1941, but milk production per cow was up only about 1 percent.

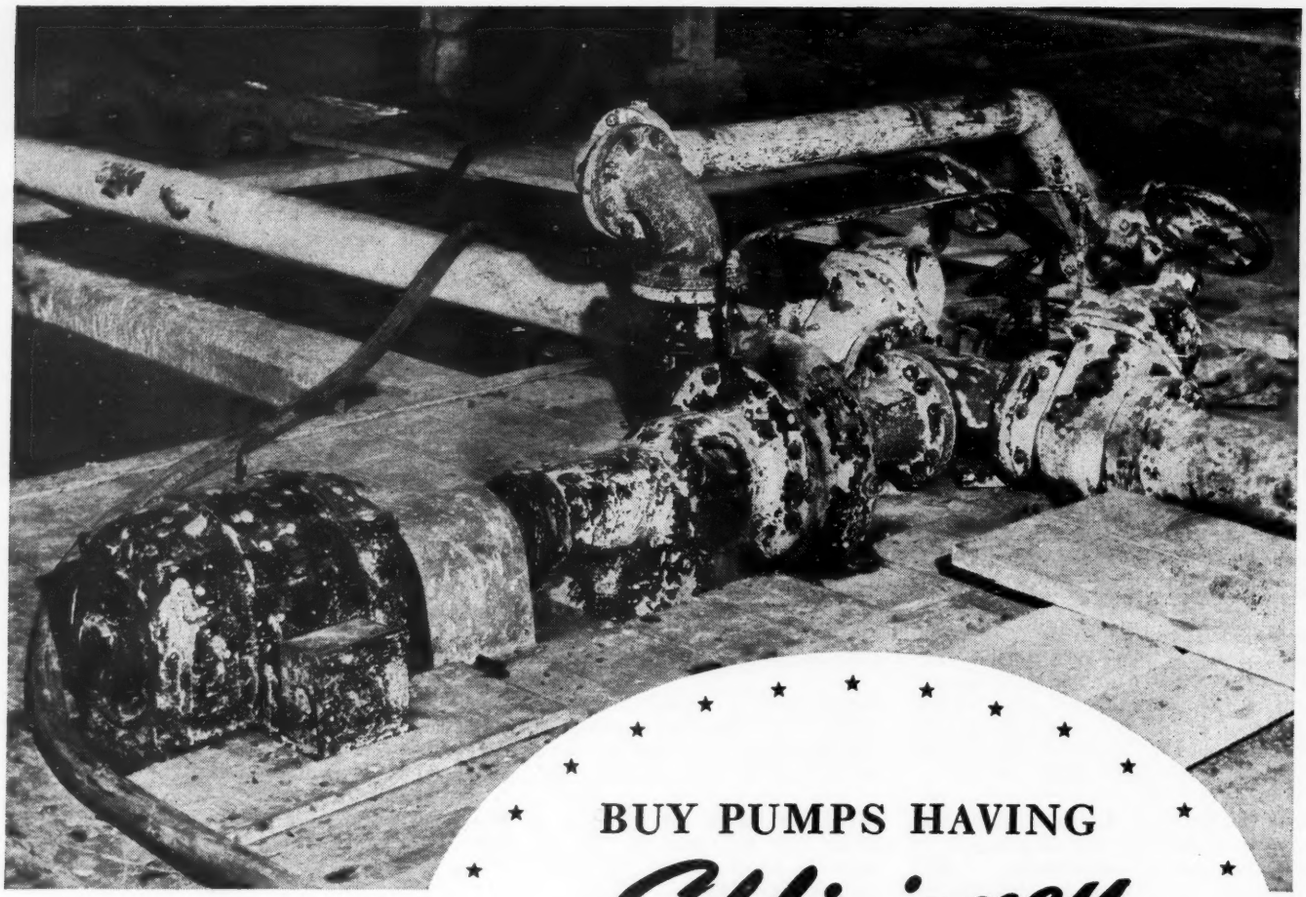
Oleomargarine sales in May, 1942, as indicated by sales of internal revenue stamps, totaled 17,079,034 lb., a decrease of 32 percent below sales in May, 1941.

Cost of living index of National Industrial Conference Board for May, 1942, was 97.3, up from 97.1 in April, and comparing to 87.4 in May a year earlier.

Business activity index of *Business Week* stood at 182.6 on July 4, 1942, compared to 183.0 on June 6, 1942, and to 162.0 a year before.

Weekly wholesale food price index of Dun & Bradstreet stood at $3.68 on July 7, 1942, compared to $3.66 a month earlier and to $3.09 one year ago.


PRODUCTION AND CONSUMPTION OF ALL MEATS, EXCLUDING LARD, AND POPULATION, UNITED STATES 1899-1941
Pounds (Billions)
Population (Millions)
Population July 1
Total production
Total consumption*
*Excludes relief distribution of meats in 1934 and 1935
Data for 1941 are preliminary
Data from Bureau of Agricultural Economics



This F-M motor and pump installation in a large gelatin plant doesn't make a pretty picture — but it tells the story of a tough job being well done.

BUY PUMPS HAVING *Efficiency*

That's More Than Skin Deep!

THOSE pumps you are about to buy for war production—will they serve you efficiently not only now but also through the years to come?

They will if you choose Fairbanks-Morse Pumps. For these pumps have mechanical superiority which permits them to retain their efficiency long after less highly engineered pumps begin to waste power.

So use your priority to buy pumps for today with an eye for tomorrow. Fairbanks, Morse & Co., 600 South Michigan Ave., Chicago, Illinois.

FAIRBANKS-MORSE

PUMPS
DIESELS
MOTORS
SCALES

MEN • JOBS • COMPANIES

INDUSTRY

Borden Co.'s plant at Chester, S. C., which formerly processed cheese, will concentrate on the canning of evaporated milk. For this purpose the plant was remodeled and enlarged at a cost of $200,000.

Canadian Canners, Ltd., has awarded contract for erection of a new concrete warehouse, 144x80 ft., at Penticton, B. C. A second factory will be erected at the same location as soon as government permission can be secured.

W. R. Carpenter Co., Ltd., has produced 80,000,000 lb. of oil at its copra plant in Vancouver, B. C., opened last year at a cost of $1,000,000. If the company is unable to get necessary tonnage of copra to operate the plant, the machinery can be converted to some other oil-producing product such as flax or soybeans.

Clyde (Ohio) Canning Co., new organization headed by George Nestor, will pack tomato juice and tomatoes this season, and will expand into asparagus and fruit canning in 1943.

Consumer Cooperative Association, Kansas City, Mo., has purchased the Scottsbluff, Neb., canning plant of Otoe Food Products Co., Nebraska City, Neb., for a reported purchase price of $155,000.

Curtice Brothers Co., Rochester, N. Y., has just constructed a concrete block warehouse at its Mt. Morris, N. Y., plant. The new building will store approximately 140,000 cases of canned foods. Curtice is also installing a new viner station for 12 viners, and a steel ensilage stacker at its Bergen, N. Y., plant, and has completed a new corn building 100 ft. long.

Fischer Baking Co., Cincinnati, Ohio, has opened a new, fully equipped plant in that city, celebrating the 29th year of its founding. A. J. Ruff is manager of the plant.

Iowa Egg Products Co., Dubuque, Ia., is reconstructing two factory buildings recently destroyed by fire, at a cost of $500,000.

Oscar Mayer & Co., Madison, Wis., has been granted a permit for the erection of a $56,000 cooling addition to its plant, to be used to cool hogs and fresh pork.

National Starch Products, Inc., Plainfield, N. J., has been awarded a Minute Man flag for 100 percent participation in the war bond drive. At recent ceremonies A. L. Pulfrey, acting manager, accepted the banner for the company.

C. B. Poole Wholesale Candy & Specialties Co. plant at Gaffney, S. C., was damaged to the extent of $200,000 in a recent fire.

WILLIAM N. STRACK

William N. Strack, prominent attorney in the meat industry, has become general attorney for Swift & Co., heading the law department in which he has served for 23 years. He succeeds E. B. Kixmiller, recently appointed general counsel in place of the late Henry Veeder. Mr. Kixmiller has been general attorney for Swift & Co. since 1931.

Rumford (R. I.) Chemical Works has had so many requests for its recently published "sugarless recipe" leaflet that the original printing of 1,000,000 copies has been exhausted; the company has put in an order for another million leaflets.

Swift & Co. will erect two additions to its La Crosse, Wis., plant, one to be used as a boiler plant and the other for the production of powdered milk.

Texas Chemurgic Industries has opened a dehydration plant costing $50,000 at Bowie, Tex., for dehydration of Irish and sweet potatoes, carrots and onions. R. E. Roberts is plant manager.

PERSONNEL

Dr. Raymond C. Bender has been appointed to the technical staff of Food Research Laboratories, Inc., Long Island City, N. Y., as nutritionist in charge of the bioassay laboratories. Miss Mona Oser will continue in an administrative capacity.

W. S. Breton, manager of Libby, McNeill & Libby's dried fruit division, has become chief of the canned foods section, OPA, relieving George Stevens, who has returned to his duties with General Foods' Birds Eye division.

Oliver H. Clapp has resigned as an assistant vice-president of Stein, Hall & Co., Inc., New York, to become associated with the Defense Supplies Corp. in Washington.

DAIRY SCIENTISTS HONORED

Dr. William E. Petersen (left) of the University of Minnesota and Dr. Hugo H. Sommer (right) of the University of Wisconsin received the 1942 Borden Awards for outstanding research in dairy science from W. A. Wentworth of the Borden Co. The Awards—$1,000 in cash and a gold medal for each recipient—were presented at the annual meeting of the American Dairy Science Association at Michigan State College, East Lansing, Mich.

Sarah V. Dugan, director, Bureau of Foods, Drugs and Hotels, State Department of Health, Louisville, Ky., was recently elected president of the Association of Food and Drug Officials of the United States. The vice-president is H. C. Lythgoe.

Lucius R. Eastman, Jr., has been elected vice-president of the Hills Brothers Co., New York, importers and packers of "Dromedary" products. He is a son of L. R. Eastman, chairman of the board, and has been with the company since 1934.

R. W. Goodell, executive vice-president, Commander-Larrabee Milling Co., Minneapolis, Minn., has been elected president to succeed S. M. Archer, now chairman of the executive committee.

Hector Lazo, president of the Cooperative Food Distributors of America, has returned to his industry post after a leave of absence to organize the trade relations branch of OPA.

A. R. Liddell, Shreveport, La., was elected president of Southern Wholesale Confectioners Association, succeeding C. C. Lindsey of Victory Specialty Co., Roanoke, Va.

J. A. Liston, Swift & Co., Joseph E. Goldberg, Polo Produce Co., and W. Eliel, College Inn Products Co., have been appointed members of the Poultry Canning and Processing Industry Committee, U. S. Department of Agriculture.

C. F. Mueller, executive of C. F. Mueller Co., Jersey City, N. J., manufacturers of macaroni products, is now senior commodity specialist with OPA.

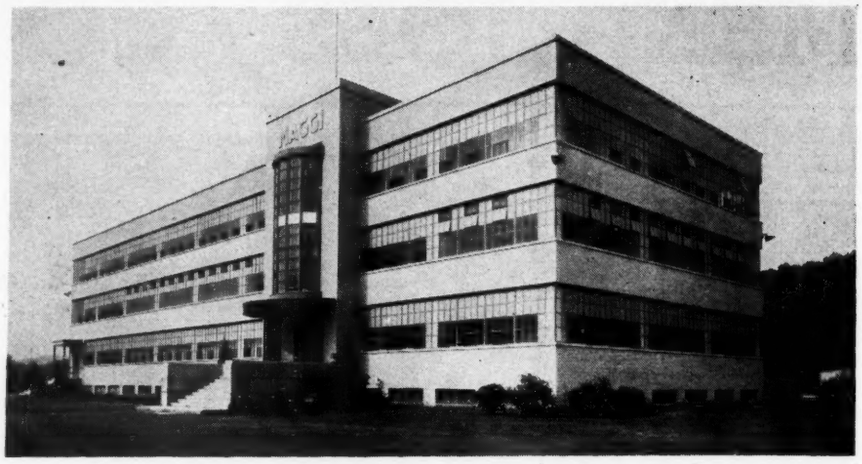
Colonel Albanus Phillips has been named president of Phillips Packing Co., Inc., Cambridge, Md., for his 41st consecutive year. W. G. Winterbottom, Sr., a cofounder, will continue as vice-president.

Harold Roth, former assistant general manager of the milling section, Omar, Inc., has been promoted to vice-president and general manager of the same division, with headquarters at Omaha, Neb.

H. B. Slingerland has been named executive vice-president, treasurer and general manager of Foremost Dairies, New York, succeeding M. G. Griffin. Howard E. Moore will continue as president.

Dr. Foster D. Snell, of Foster D. Snell, Inc., Brooklyn, N. Y., has been named chairman of the American Section of the Society of Chemical Industry for the coming year. Dr. Norman A. Shepard is vice-chairman.

Horace M. Wigney, formerly assistant vice-president of Union Asbestos and Rubber Co. in charge of research and development of refrigerator car specialties, has been appointed chief of the refrigerator car section, Office of Defense Transportation. Mr. Wigney has served with Pacific Fruit Express, Merchants Dispatch Transportation Co., Dairy Shippers Dispatch, and Safety Refrigeration, Inc., which once operated a fleet of silica gel refrigeration cars.



MAGGI CO. BOUILLON PLANT IN NEW MILFORD, CONN.

Two large new Maggi Co. plants have been completed and are now in operation in New Milford, Conn., to manufacture the company's well-known bouillon and seasoning. The buildings are of steel, concrete and brick construction and include the latest manufacturing facilities. Maggi's bouillon in both cube and granulated form is being processed in this plant, while another building is devoted to the manufacture of the seasoning formerly imported from Switzerland.

DEATHS

Martin Ashburn, 59, founder of Ashburn Ice Cream Co., Dallas, Tex., June 25, in Dallas.

Cecil Kelly Bowen, 59, office manager of the salmon department of Libby, McNeill & Libby, at Seattle, Wash., recently, in Seattle.

Edward J. Geise, 60, general manager of Olean (N. Y.) Baking Co. for the past 30 years, July 7, in Olean.

Kenneth E. Hatfield, 45, general manager of the Cudahy Packing Co. plant at Kansas City, Mo., July 1, in Rochester, Minn.

Roy W. Hemingway, 61, president of H. C. Hemingway & Co., Auburn, N. Y., July 11, following injuries sustained in a fall. Mr. Hemingway was a member of the executive committee of National Canners Association and former president of New York State Canners Association.

Douglas Hooper, 53, assistant superintendent of the California Packing Corp. plant at Smithfield, Utah, and Marion L. Farrell, 51, master mechanic, died June 18 after being overcome by gas in a well at the Smithfield plant.

Dr. Abraham Lichterman, 46, acting director from 1935 to 1939 of the Bureau of Foods and Drugs of the Health Department, June 26, in Brooklyn, N. Y.

George Meyer, president and general manager of the Fredonia (Wis.) Canning Co., June 28, in Port Washington, Wis.

William R. Phillips, well-known figure in the coffee industry, and executive of Grace & Co., July 4, in San Mateo, Calif.

William T. Rich, 79, former partner of the Chase & Sanborn Coffee Co., July 6, in Newton, Mass.

Carl Schaaf, 77, head of Schaaf Preserving Co., Inc., Miami, Fla., and the Pride of Miami Co., July 2, in Miami.

ASSOCIATED INDUSTRIES

Allegheny Ludlum Steel Corp. has received Treasury Award flags for war bond purchase in three plants, at Brackenbridge, Pa., Watervliet, N. Y., and Dunkirk, N. Y. Individual presentation ceremonies were held at each plant.

Allis-Chalmers Manufacturing Co. in 90 days completed a new plant for the production of Navy material, and machines are already in production. The emergency building is of wood construction with brick facing, and covers an area of 200,000 sq. ft.

Carrier Corp. has announced that Cloud Wampler, executive vice-president, has been elected to presidency of the corporation, succeeding the late J. Irvine Lyle. E. T. Murphy was elected to the board of directors to fill the vacancy created by Mr. Lyle's death.

Dairy Industries Supply Association will soon center all of its activities in Washington, D. C., moving there from its New York office.

FOOD EQUIPMENT NEWS

Air Raid Fighter's Truck

PALMER-SHILE Co., Detroit, Mich., has brought out a hand truck designed to hold all the equipment essential to fighting factory fires caused by incendiary bombs. With a length of 4 ft. and a width of 2 ft., the truck has spaces partitioned off for holding sand pails,

Truck for air raid fighter's supplies

water cans, fire extinguishers, axe, shovel, rake and other necessary equipment. There is also a metal box with hinged lid for asbestos gloves, goggles, first aid kit and other supplies.

Dehydration Equipment

DOUTHITT CORPORATION, 221 North LaSalle St., Chicago, long known for its spray drying equipment used in the drying of milk and eggs, has brought out two types of dehydraters suitable for the processing of vegetables and fruits. They are a tunnel dehydrater and a Duplex Compartment dehydrater.

The Douthitt tunnel dehydrater and pressure blancher is 74 ft. 8 in. long, 6 ft. 6 in. wide and 9 ft. 3 in. high. It accommodates 15 cars, each holding 44 wire screen trays. This total of 660 trays has an area of 4,084 sq. ft. Capacity, depending on the product being dried, is from 5 to 15 tons of fresh material per 24 hour day.

The Douthitt Duplex Compartment dehydrater and blancher is 48 ft. 9 in. long, 8 ft. 10 in. wide and 8 ft. 1 in. high. It is made up of six dehydrating and blanching compartments, each accommodating one car holding 56 wire screen trays. The total charge per cycle is 336 trays of 2,079 sq. ft. total area. Capacity, depending upon the product being processed, is from 2½ to 7½ tons of fresh material per 24 hour day.

Both of these dehydraters are equipped with automatic control of temperature, humidity and velocity of air circulation. Recirculation is employed to effect a saving of heat.

Plastic Cork Coating

A PLASTIC cork coating, called "No Drip," that stops dripping from condensation on pipes, tanks, wall, ceilings, etc., has been developed by J. W. Mortell Co., Kankakee, Ill. This product can be brushed on with an ordinary paint brush. It is spread ¼ in. thick over any metal, concrete, brick, plaster, tile, wood, composition or painted surface. After application, it can be covered with paint in any color.

Insulating Material

OWENS-CORNING FIBERGLAS CORPORATION, Toledo, Ohio, has brought out the "AE" insulating board for low temperature and roof insulation work. The maker particularly recommends this board for the insulating of refrigerated cold storage spaces used for the preservation of perishable foods. "AE" board is made of pure glass fibers, compressed to a density of 6 lb. to the cu. ft. and completely inclosed in a sheathing of durable asphalt of a high melting point. The heat conductivity of the board is 0.265 B.t.u. per sq. ft. per hr. per degree Fahrenheit per inch thickness at a mean temperature of 60 deg. F. This is said to be one of the best heat conductivity figures of available cold storage insulating materials.

One feature of the board is its low moisture absorption. The maker states that, after being completely immersed in water at 78 deg. temperature for 196 hours, this board showed a gain in weight of 90.5 percent. Other insulating materials for low temperature work, tested in the same way show gains ranging from 64 to 261 percent. In another test, when exposed in a humidity cabinet at 70 deg. F. and 65 percent relative humidity, the moisture pick-up from previously dry condition was 0.064 percent by weight.

The new insulating board is made in the "American Standard" size for refrigeration insulation—12x36 in.—and in thicknesses of 1, 1½ and 2 in.

The blocks are made with truly square edges and corners and the asphalt coating is sanded to prevent adhesion of the blocks during shipment or storage. In insulating a wall, roof or floor with this material, special size pieces can be made up on the job by sawing the board with an ordinary wood saw in which the blade is lubricated with kerosene to prevent the asphalt coating from gumming the teeth. The cut edges of the board are then sealed with hot asphalt before it is put in place in the wall.

In placing insulation from this material, the blocks of insulating board

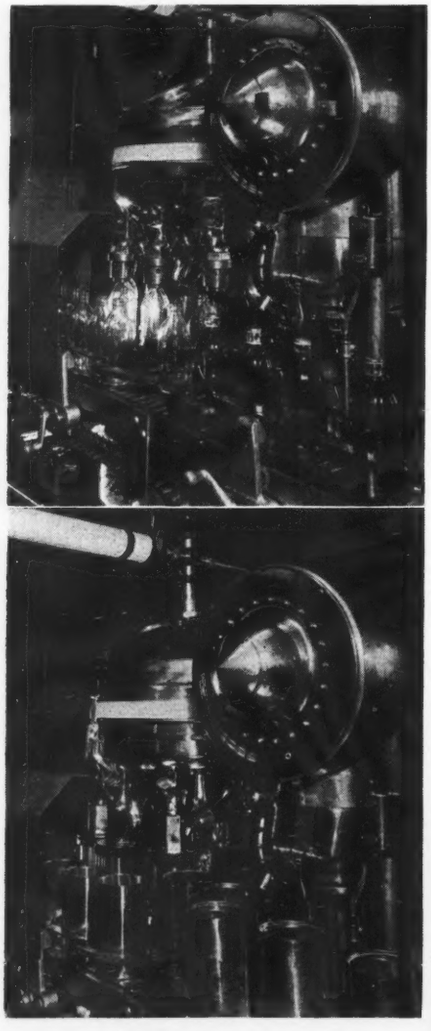
Erecting an insulating wall of "AE" asphalt inclosed fiber glass board.

are dipped in hot asphalt just prior to being placed in position.

In addition to its low heat conductivity, advantages claimed for this insulation are immunity to rot, decay and fungus growth. The materials is also regarded as a fire retardant. In addition, it is odorless in low temperature service and will not absorb odors.

Filler for Glass or Tin

A VACUUM filler that will fill glass now and tin later, when available, has been developed by Mojonnier Bros. Co., 4601 West Ohio St., Chicago. The machine will fill and cap either bottles using crowns or jars using vacuum caps. By a change over requiring not more than 30 minutes, the machine can be equipped to handle the filling of tin cans. To change from one size of glass container to another is said to require only about five minutes.



Above, filling apple juice into bottles; below, same filler filling apple juice into cans.

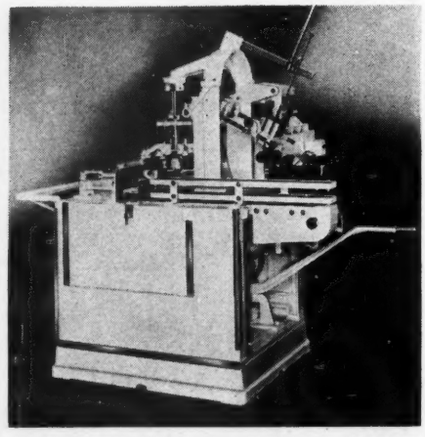
This vacuum filler is available in four models, to meet the requirements of large and small plants. All models are rotary and fully automatic. Bottles are fed to the filler by conveyor and discharged onto the same conveyor line, as shown in the illustrations. The filler has been designed for easy filling and sterilizing and, being of all welded construction, has no crevices where the product could lodge. It is adapted to fill any liquid or semi-liquid, at speeds ranging from 28 to 300 bottles per minute.

Advantages claimed for this filler are: uniform filling levels; no drip, slop-over, or underfilling; fills hot or cold products; handles containers from 4 oz. to 2 qt.; will not fill broken bottles; filling heads cannot leak; no aeration of product.

Labeling Machines

ECONOMIC MACHINERY Co., Worcester, Mass., has brought out new designs of automatic labeling machines, the "Uni-Turret" labeler and the "Twin Turret" labeler. The principal feature of design of this new labeler is its turret construction, which is said to provide compactness and simplicity as well as high efficiency of operation. Arrangements are made to control the containers completely and firmly while passing through the labeler to assure clean, smooth, firm labeling that is fully automatic and continuous.

The "Uni-Turret" machine applies single body labels—and neck labels and foil, if desired—to all shapes and sizes of glass containers from 6 oz. to 1 qt. capacity. A feature of the labeler is a patented, sliding picker arrangement that gums the entire label surface, or any portion of it that is desired. This is said to give firm label application on all types of bottles—smooth, fluted or fancy. Each label receives two direct pressure wipes at separate wiping stations. Safety devices are provided to safeguard against production jams or interruptions. A 1 hp. splashproof motor powers the labeler, including the conveyors, which are built in the labeler so that the containers are transported on a solid foundation, free from vibration and wobbling. A dating attachment for applying date or code numbers on the underside of the label is available as an extra.

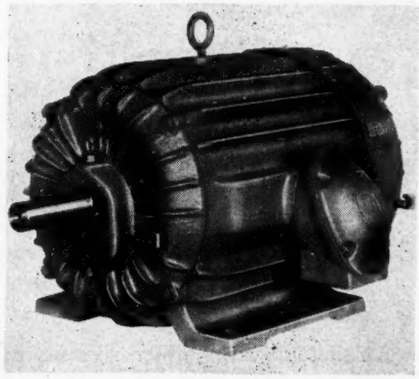


"Unit-Turret" automatic labeling machine for glass containers from 6 oz. to 1 quart.

The "Twin Turret" machine is in general similar to the "Uni-Turret." Its two labeling units may be operated independently to permit continuous production without shutting down preceding or following operations whenever there is a change in bottle size, or a maintenance operation to perform.

Enclosed Motors

CROCKER-WHEELER ELECTRIC MANUFACTURING Co., Ampere, N. J., has developed the "Cowl-Cooled" motor, a fan-cooled motor designed for use in dusty locations and applications where a totally enclosed motor is recommended In this motor, air from the fan is blown over external ribs which run the length of the frame. This action is said to keep all dust, fumes, oil or dirt out of the motor.

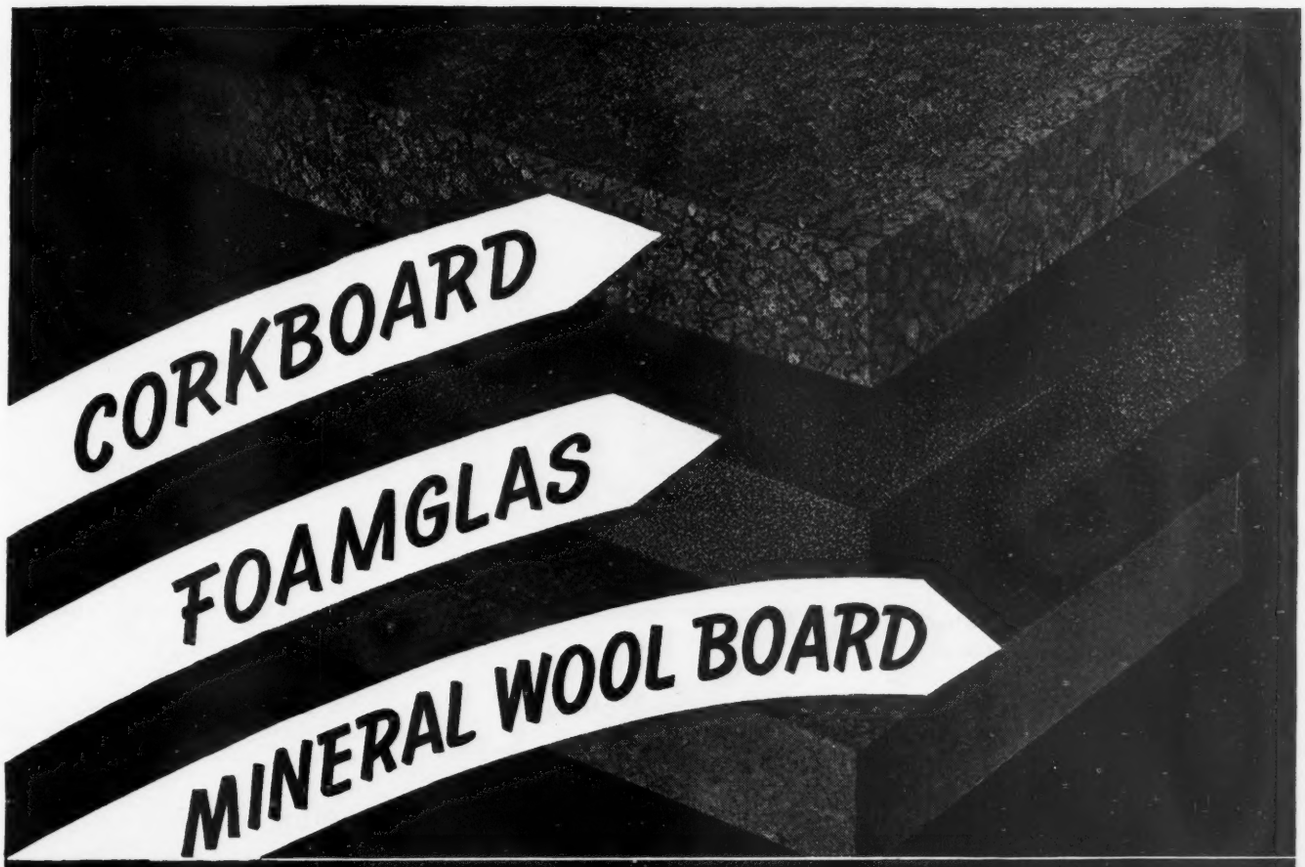


"Cowl-Cooled" electric motor for severe service.

These motors are for general, all-purpose applications. They are rated 55 deg. C. rise, full load continuous duty. They are built in the frame sizes for open motors of corresponding horsepower and speeds, with mounting dimensions conforming to NEMA standards. They are available in 220, 440 and 550 volts; 3 phase; or 220 and 440 volt, 2 phase; 60 cycles, ¾ to 25 hp. Also 25 cycles motors are available from ½ to 10 horsepower.

Belt Vulcanizer

CHANGE in design of the No. 28 belt vulcanizer has been announced by the B. F. Goodrich Co., Akron, Ohio. This device is now made with a square instead of a diagonal head, so that it is possible to cure wider belts. Widths of 34 in. can be cured in the vulcanizer placed at right angles across the belt. By placing the vulcanizer at various other angles, belts of 28 in., 24 in. and 16 in. widths can be cured. The new



ONE OF THESE ARMSTRONG MATERIALS WILL MEET YOUR INSULATION NEEDS

ANYONE planning construction requiring low temperature insulation, can count on getting the right material at "Insulation Headquarters." Armstrong engineers have had years of experience with all kinds of insulation problems. And "Headquarters" has *three* efficient materials for you to choose from:

ARMSTRONG'S CORKBOARD

Cork is high on the Government's list of essential war materials. Hence Armstrong's Corkboard is available only for vital installations. This pure cork material forms an unusually effective barrier to heat's passage—holds low temperatures in close ranges and keeps refrigeration costs at a minimum. Corkboard is light, strong, rigid. Being highly resistant to moisture and to common forms of deterioration, it gives dependable protection for years.

ARMSTRONG'S FOAMGLAS

Foamglas is a brand-new form of glass, made up of thousands of tiny airtight cells. The slight vacuum in these cells forms an efficient heat barrier. Foamglas not only is *waterproof* but even more important, it is *vaporproof*. It keeps its original insulating efficiency permanently. Foamglas has a compressive strength of 130 lbs. per square inch, and is absolutely fireproof, verminproof, and odorless. In addition, Foamglas is light in weight, and can be sawed and worked with ordinary tools. It is a noncritical material made in one size, 12″ x 18″ and in 2″, 3″, 4½″, and 6″ thicknesses.

ARMSTRONG'S MINERAL WOOL BOARD

This new noncritical material is basically mineral wool with a waterproof binder and is processed into structurally strong boards. These boards can be erected without any supporting members and will stay permanently in place without sagging, settling, shrinking, swelling, or warping. Armstrong's Mineral Wool Board is quickly and easily erected. It has a low thermal coefficient, good moisture-resistance and is free from objectionable odor and from any liability to rot, mold, or harbor vermin. One standard size, 12″ x 36″, and thicknesses from 1″ to 4″ are available.

COMPLETE INSULATION SERVICE

No matter what your low temperature needs may be, you can be sure of expert engineering assistance and unbiased advice at "Insulation Headquarters." For full facts about any or all three of these insulating materials, call your nearest Armstrong Office, or write direct to Armstrong Cork Co., Building Materials Div., 916 Concord Street, Lancaster, Pa.

ARMSTRONG CORK COMPANY
Insulation Headquarters

Corkboard • Cork Covering • Temlok • Fiberglas* • Mineral Wool Board • Foamglas
*Reg. U. S. Pat. Off. O.-C. F. Corp.

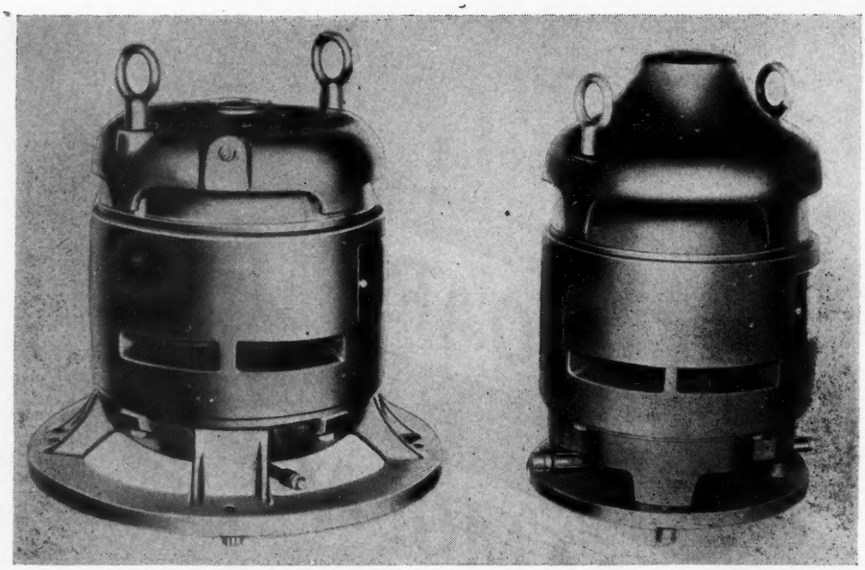
design has a platen 11x36½ in., an overall length of 41 in., an overall height of 23½ in. and weighs 380 lb. complete with sheet iron platen covers, curing pad, and two 25-ft. lengths of extension cord.

To distinguish this design from the previous design, it is known as the "Square End No. 28".

Continuous Vegetable Peeler

FOR peeling potatoes, beets, carrots, turnips and other vegetables in food processing plants, Food Machinery Corp., Sprague-Sells Div., Hoopeston, Ill., has developed a continuous vegetable peeler. The manufacturer states that this machine will peel vegetables rapidly and economically, yet preserve the original shape of the vegetable.

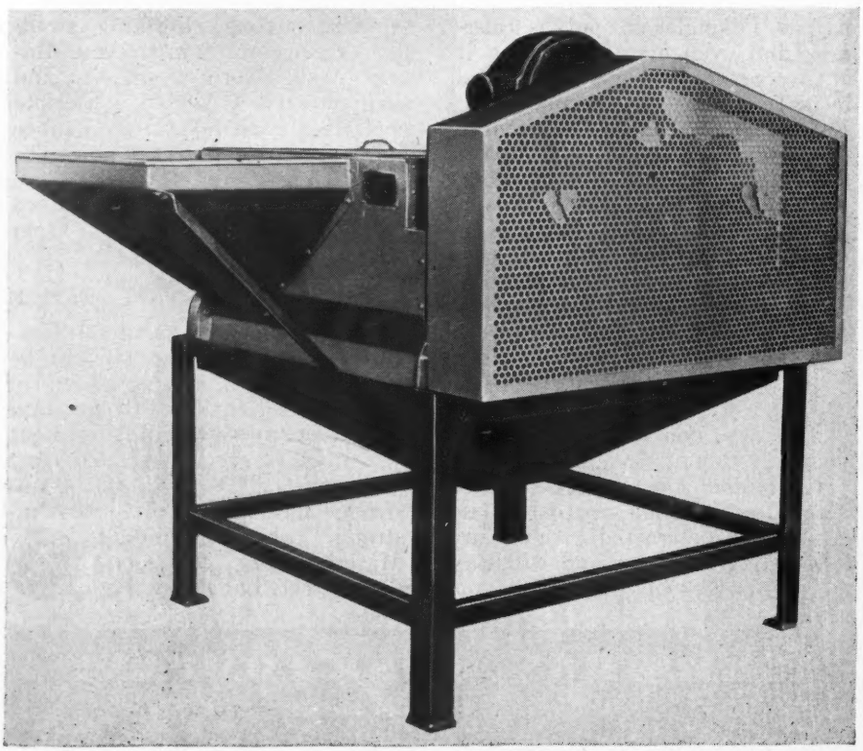
The machine consists of a feed hopper and four bins, each of which is equipped with four carborundum coated rolls, all turning in one direction at high speed. The four rolls in each bin are fastened together in pairs. Each of these pairs has a separate rocking motion that turns the vegetable over and over. In this way, the carborundum roll surfaces remove the peel completely as the vegetable moves through the machine, from feed hopper to discharge spout. The first, second, and third bins have coarse, rapid peeling carborundum rollers, while the rollers in the fourth and final bin are coated with fine carborundum to do a finishing job.



At left is a vertical polyphase induction motor, general purpose type and at right is a shielded motor of same design, both being members of the General Electric "Tri-Clad" family.

New Vertical Motors

GENERAL ELECTRIC Co., Schenectady, N. Y., has added three new types of motors to its "Tri-Clad" line. These consist of a vertical general purpose, polyphase motor, a vertical shielded polyphase motor, and a vertical shielded, single phase motor. The first two of these are availale in sizes from 1 to 20 hp. and the last in sizes from 1 to 5 hp. The shielded type motors are especially suited for pumping applications and the general purpose motor is suitable for driving such equipment as agitators and mixers.



Continuous vegetable peeling machine for processing plants.

Insulating Board

A MINERAL wool board for the insulation of refrigerated spaces and equipment has been introduced by Building Materials Div., Armstrong Cork Co., Lancaster, Pa. The board is said to equal or exceed Federal Specification HHM-371 for board or block form insulation, having a thermal conductivity ranging from 0.31 to 0.33 at 90 deg. F. It is also said to have good moisture resistance and ample structural strength for satisfactory handling in erection. It is self-supporting and will stay permanently in place without sagging, settling, shrinking, swelling or warping. It is also free from objectionable odor and from any tendency to rot, mold, or harbor vermin.

Armstrong's Mineral Wool Board is made in 12x36 in. boards, in thicknesses of 1 in., 1½ in., 2 in., 3 in., and 4 in. It is applied the same as corkboard. Erection in hot asphalt with multiple layer construction is recommended. Outside finish may be Armstrong's "Asphalt Plastic" or portland cement plaster.

Pump Pipeline Strainer

TO SUPPLEMENT its regular line of pumps and accessories, Blackmer Pump Co., Grand Rapids, Mich., has put out a series of strainers for pipe sizes from 1 to 6 in. Known as the "Ezy-Kleen" strainer, these devices can be installed with all types of pumps or wherever a strainer is required in a piping layout. The basic design is that of the standard

AMMUNITION

FOR THE *Home* FRONT

This is a total war . . . Battles are not only being fought in bitter combat with a far distant enemy, but deep within the nation in countless factories and homes.

Does your product . . . be it soup, candy, bread, cereal, flour, or what not . . . provide the ammunition essential to a successful prosecution of the war on the home front? Has it the *minerals,* as well as vitamins, required to sustain a virile, fighting people? . . .

Calcium (Ca)
. . . for strong bones and teeth.

Phosphorus (P)
. . . to improve utilization of calcium and body functions.

Iron (Fe)
. . . to build red blood corpuscles.

Through constant education, via press and radio, housewives have become vitamin *and* mineral conscious as never before. Purchases at the corner grocery or drug store are today being critically appraised for vitamin and mineral content. That product which is lacking is at a decided competitive disadvantage.

As world's leading manufacturer of food grade phosphates, Victor is playing an important role in making these vital minerals readily and economically available. Today, you can provide essential Calcium, Phosphorus, and Iron in your product *at no additional cost to the consumer.* Our technical staff has had considerable practical experience in solving processing and similar problems . . . will be glad to give any assistance you may require. Just write us.

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Monocalcium **PHOSPHATE**
Dicalcium **PHOSPHATE**
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Monosodium **PHOSPHATE**
Disodium **PHOSPHATE**
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141 W. JACKSON BLVD., CHICAGO, ILL., NEW YORK, N. Y., KANSAS CITY, MO., ST. LOUIS, MO., NASHVILLE, TENN., GREENSBORO, N. C. PLANTS: NASHVILLE, TENN., MT. PLEASANT, TENN., CHICAGO HEIGHTS, ILL.

in other words....

The Perfect Chip!

The kind of chips you might single out as samples from the old-fashioned batch method are typical of *every* chip turned out on

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There's no guess work, no seconds, no waste. Because from raw unpeeled potatoes to perfect finished chips every operation except inspection of the slices is completely automatic and continuous . . . Peeling, slicing, drying, frying, cooling and salting are all under "push button control" . . . Hour after hour, day after day, the product of a Ferry Machine never varies from top quality—and, better yet, production costs are far lower than by any other method. Made in 5 sizes with capacities from 50 to 400 lbs. of chips per hour . . . Bulletin F.I. gives you the whole story—write for it today.

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CAN WASHING MACHINERY

J. D. FERRY CO.
129 SO. CAMERON St.
HARRISBURG, PA.

basket type strainer. The bodies are made of iron or are available in bronze. Steam-jacketed bodies can be furnished where necessary. The baskets are made of steel or brass woven wire cloth, fine or coarse mesh, and are reinforced. A handle is provided for removing the basket from the strainer body for cleaning. The cover on the body is held in place by thumbscrews.

The new strainers are rated on the basis of flow in gallons per minute and are furnished in five sizes from 50 to 700 gallons per minute. In standard construction they are suitable for operating pressures up to 50 lb. per sq. in. and for temperatures up to 275 deg. F.

Milk Bottle Hooding Machine

Package Machinery Co., Springfield, Mass., has designed a milk bottle hooding machine that will apply registered printing on parchment or other types of milk bottle closures. This is a three-headed rotary unit machine, which manufactures the milk bottle hood, applies it, and bands it with tape, and also registers the printing directly on the center of the bottle top. The company also states that the newly designed registering unit can be incorporated on other standard machines made by this company, which employ the same type of paper feed. The capacity of the new machine is around 90 bottles per minute.

Shatterproofing for Window Glass

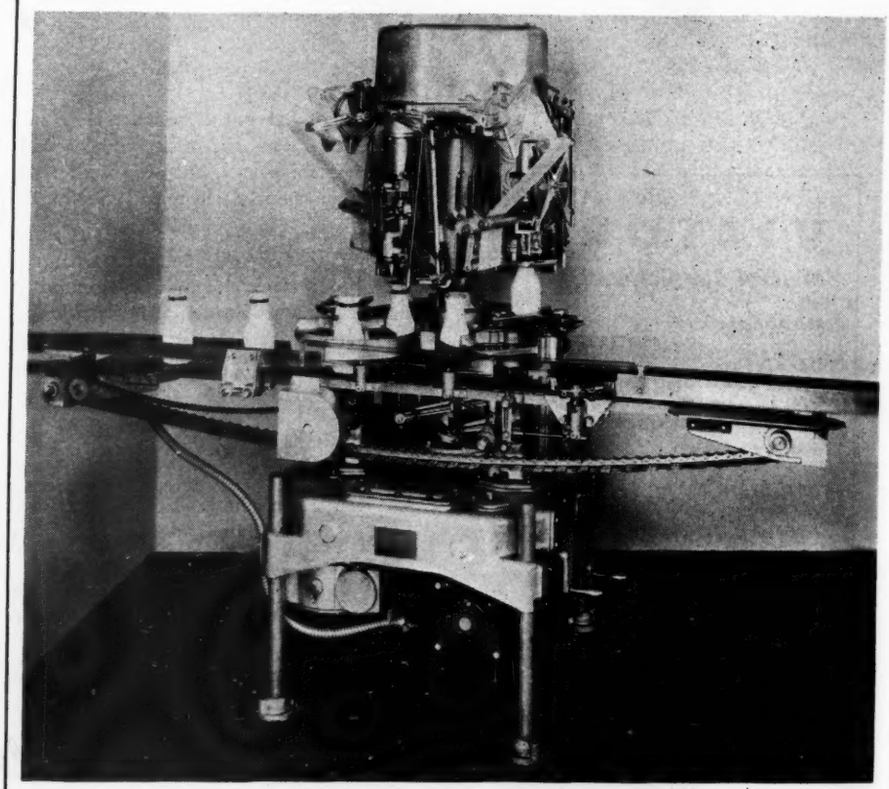
Because flying glass from broken windows forms one of the greatest dangers during bombing raids, Arabol Manufacturing Co., 110 E. 42nd St., New York City, has placed on the market a "Shatterproof" paste developed to minimize this hazard.

In use, this material is applied either by using it to paste cloth or netting on the inside of window-glass or, where blackout is desired, substituting a black, opaque fabric. Characteristics of the paste are such that it does not easily crystallize or become affected by temperature and humidity changes. It is said to retain its elasticity and strength for holding glass splinters to the cloth netting over long periods.

In application, the cloth material is cut to the size of the window pane, allowing ½ in. overlap on all sides. The glass and sash are then covered with the paste and the cloth is applied. To remove, the material is simply stripped off and the paste washed away with plain water.

Synthetic Hard Rubber

B. F. Goodrich Co., Akron, Ohio, has developed hard rubber made from its synthetic product, Ameripol. It is stated that this new product will withstand temperatures 100 deg. F. higher than hard rubber made from natural crude,



Milk bottle hooding machine which manufacturers the hood, applies it, bands it, with tape and registers printing directly on the center of bottle top.

before softening occurs. Because of this quality the maker states that the new product will extend into the field of hard rubber in construction of equipmen and accessories.

Dried Egg Sifter

GREAT WESTERN MFG. CO., Leavenworth, Kan., is making the Type V egg sifting machine. This is a gyratory sifter, operated by a ⅓ hp. motor and equipped

Sifter of gyratory type for powdered egg

with a 16 mesh sieve. It suspends from a single point directly above the barrel or drum in which the eggs are being packed. A skirt is tied around the bottom of the machine and dropped into the head of the barrel to prevent spilling. When smaller packages are being filled, the sifter is arranged to discharge into a hopper with a bottom opening of suitable size.

In operation, the dried egg is conveyed directly to the sifter or is fed to it by scoops. Before sifting, the product should be cooled to around 85 deg. F., as quality is likely to be lowered if the product is packed at higher temperatures. The capacity of the unit is over 500 lb. per hour through 16 mesh screens. Screens up to 20 mesh can be used, if desired.

V-Belts

B. F. GOODRICH CO., Akron, Ohio, have recently announced the production of static-discharging and oil-resistant V-belts in all popular stock sizes of A, B and C cross sections. The static-discharging feature is of great interest to those in the food industries where hazards of explosion and fire exist because of dusty atmosphere. Also, the oil-resistant feature should have useful applications in machine drives where oils or fats are present.

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Engineer
near by and
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Before American men can build the planes, tanks, guns, and boats that are going to *win* this war, they must be well fed.

Your job is to keep your equipment at its peak performance level, to supply them with the fresh healthful food that will give them the energy needed to perform the tasks that we, as Americans, have to do.

Have a VILTER Engineer check your refrigeration system for its efficiency . . . even though it may not be a Vilter installation.

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Air Conditioning
Refrigeration . . .

One Reason

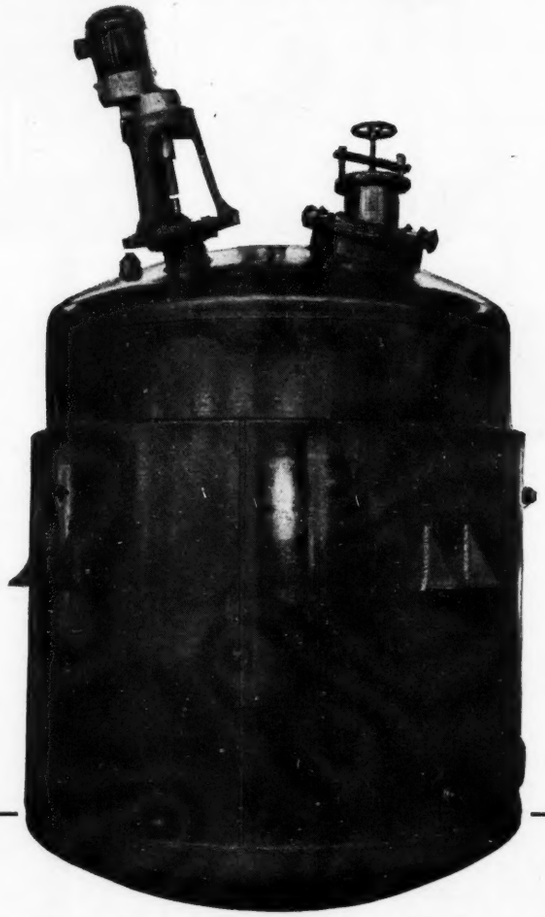
WHY AMERICA WON'T GO HUNGRY

...a Steam Jacketed Kettle designed and constructed by Patterson-Kelley for the food industry

Without specialized, heavy equipment to prepare the produce of the land for market, 130,000,000 Americans might have to grub in the soil for their own food — or go hungry. For years, Patterson-Kelley has built durable, efficient equipment for leading packers and manufacturers of food products.

Manufactured under rigid standards, which call for the finest in workmanship and materials, Patterson-Kelley kettles, mixers, cookers, dryers, dehydrators and heat exchange units give years of dependable, economical service. Each step in the manufacture of a piece of Patterson-Kelley equipment is carefully checked by experienced engineers. They work in close cooperation with designers, mechanics, inspectors. *Result:* a completed unit that meets performance specifications with maximum precision and accuracy.

Patterson-Kelley equipment may be fabricated from a wide range of metals, in accordance with the requirements of your operating conditions. If you're faced with a tough equipment problem, call in Patterson-Kelley engineers for expert consultation — at no obligation to you. Write today for a free copy of the Patterson-Kelley Chemical and Process Equipment Catalog.



Patterson-Kelley Steam Jacketed Kettle, constructed in accordance with A. S. M. E. standards, for 125# steam working pressure in jackets and full shell vacuum. Mixer is of the propeller type (double section). 120 r.p.m. for use in viscous fluid. Dimensions: 76" in diameter and 78" high, excluding heads.

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PATTERSON-KELLEY HEAT EXCHANGE ENGINEERS

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MANUFACTURERS FOR THE FOOD AND PROCESS INDUSTRIES

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BOOKLETS • LITERATURE • BULLETINS

FOOD PLANT EQUIPMENT

Centrifugal Pumps—Class GT two-stage centrifugal pumps 100 to 2200 gal. per minute, 50 to 450 lb. pressure, and 150 to 1050 ft. head, as used in breweries, refineries, canning plants, packing plants and other industrial installations are described in a 12-page illustrated bulletin, Form 7167, issued by Ingersoll-Rand Co., 11 Broadway, New York.

Dust Collector—A high efficiency, long cone, cyclone dust collector for application either as a collector of process dust created in manufacturing or as a preliminary collector ahead of a cloth type filter collector is described in Catalog No. 82, an illustrated publication including an engineering manual section on dust collector operation, published by American Foundry Equipment Co., Mishawaka, Ind.

Homogenizer—A homogenizer of 100 gal. per hour capacity particularly designed for the homogenization of milk and ice cream mix is described in a recent leaflet published by Homogenizer Corp. Ltd., 227 No. Robinson Boulevard, Beverly Hills, Calif.

Industrial Trucks—Storage battery operated electric industrial trucks, in capacities of 6,000 lb. each, in low lift, high lift, and telescopic types, are illustrated and described with specifications in Bulletin 155 of Mercury Mfg. Co., 4044 So. Halsted St., Chicago.

Mixing Equipment—"Flexibility in Mixing Operations" is the title of an 8-page illustrated bulletin describing the AMF Glen mixer, a device operating on the planetary mixing principle and available in bowl sizes from 10 to 85 gal., issued by American Machine & Foundry Co., 511 Fifth Ave., New York.

Oil Burners—Bulletin No. 107 explaining the constant differential wide range oil burning system for the firing of industrial and power boilers, has been issued by Peabody Engineering Corp., 580 Fifth Ave., New York.

Pumps—Engineering data on "SSUnit" and "Electrifugal" pumps, in capacities from 10 to 2750 gal. per minute and for heads up to 575 ft., are given in 36-page illustrated Bulletin B6018-B, published by Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Refrigeration Equipment – Standard Prime Surface Cold Plates for use in such refrigeration applications as refrigerated trucks and cabinets are described in a new catalog issued by Standard-Dickerson Corp., 46-76 Oliver St., Newark, N. J.

Valves—Semi-steel valves and fittings for use with refrigerating equipment or in other applications where gases or liquids of a similar nature are employed, are briefly discussed in a 6-page bulletin No. 191-A issued by the Frick Co., Waynesboro, Pa.

Valves—Quick operating valves for boiler room and other services are described and illustrated with specifications and prices in 32-page Bulletin E-100, published by Everlasting Valve Co., 49 Fisk St., Jersey City, N. J.

PLANT SUPPLIES

Glass Fiber Insulation—"AE" insulating board for refrigerated spaces, made of "asphalt-enclosed" fiber glass, together with information as to its installation in rooms and buildings, is given in a 16-page illustrated bulletin entitled "How to Apply Fiberglas AE Board," published by Owens-Corning Fiberglas Corp., Toledo, Ohio.

Filter Media—Various types of filter papers and also two types of filter mass are described in an 8-page bulletin published by H. Reeve Angel & Co., Inc., 7 Spruce St., New York City.

Floor Cleaning—Technical Bulletin No. 62, entitled "The Cleaning of Industrial Floors," describes floor cleaning compounds and their application to all types of industrial floors as recommended by Magnus Chemical Co., 120 South Ave., Garwood, N. J.

Lubrication—The use of natural colloidal graphite lubricants in industrial service is discussed and prices given in a recent folder issued by National Graphite Co. Inc., 17 John St., New York.

Shipping Containers—"How to Seal" is the title of a booklet describing the four most commonly used sealing methods for corrugated shipping cartons, including the use of adhesives, gummed tape, metal staples, and steel or wire straps; issued by Hinde & Dauch Paper Co., Sandusky, Ohio.

Sponge Rubber—"Ameripol" synthetic rubber sponge and its characteristics and qualities are briefly discussed in a 4-page illustrated catalog section No. 8010 published by the B. F. Goodrich Co., Akron, Ohio.

Stainless-Clad Steel—A standard classification and base price list of sheets, plate and other forms of "Silver-Ply" stainless-clad steel has been issued by Jessop Steel Co., Washington, Pa.

CONTROL EQUIPMENT

Control Equipment—Non-indicating control equipment known as the Tag No. 42 for the control of temperature and pressure, is described in 36-page illustrated catalog No. 900E, which contains complete details of operation specifications and prices, issued by C. J. Tagliabue Mfg. Co., Park and Nostrand Aves., Brooklyn, N. Y.

Speed Recorders—Catalog No. N-27 is a 12-page descriptive catalog covering Micromax speed recorders for use in connection with the operation and regulation of rotating machinery, published by Leeds & Northrup Co., 4934 Stenton Ave., Philadelphia, Pa.

Temperature Control – Various types of temperature regulators for controlling the heat of industrial processes and water heaters are illustrated and discussed with specifications and prices in 16-page Bulletin No. 600 published by Sarco Co., Inc., 475 Fifth Ave., New York.

PACKAGING

Labeling Machine Maintenance—"Liberty and Labeling" is the title of a recent 8-page bulletin on the care and maintenance of labeling machines during the war period, published by Economic Machinery Co., Worcester, Mass.

Sausage Casings—"New Ways to Profits with Zipp Casings" is the title of a 16-page booklet illustrating and discussing the use of Zipp vegetable parchment casings for sausages and similar products, as made by Identification, Inc., 4541 No. Ravenswood Ave., Chicago.

MISCELLANEOUS

Belting Maintenance—"Care and Maintenance of Conveyor and Elevator Belting" is the title of Catalog No. 2800, a guide to prolonging the life of rubber belting, issued by B. F. Goodrich Co., Akron, Ohio.

Metal Spraying—Maintenance of machines and equipment, by building up worn parts by means of sprayed-on metal, is discussed in 16-page Bulletin No. 42A, published by Metallizing Engineering Co., Inc., 21-07 41st Ave., Long Island City, N. Y.

Scales—"Looking In On Honest Weight" is the title of a 15-page illustrated booklet discussing the plant equipment and the personnel of the Toledo Scale Co., Toledo, Ohio.

BOOKS

War and British Marketing

EFFECTS OF THE WAR ON BRITISH MARKETING. Published by the U. S. Department of Commerce, 1942. 74 pages; 5¾x9 in.. Paper. Price, 15 cents; for sale by Superintendent of Documents, Washington, D. C.

Price controls in Britain have not prevented substantial increases in prices. Wholesale prices rose 61 percent from the outbreak of the war to February, 1942, while the cost of living went up 29 percent. This is one of the significant bits of information contained in this pamphlet, prepared to inform Americans about England's wartime marketing experiences and help us to avoid her errors and to take advantage of her successes.

Meat Tenderizers

PROTEIN DIGESTING ENZYMES OF PAPAYA AND PINEAPPLE, by A. K. Balls. Published as Circular No. 631 by the U. S. Department of Agriculture. December, 1941. 10 pages; 5¾x9 in.; paper. Price 5 cents, for sale by Superintendent of Documents, Washington. D. C.

Investigation of the changes that meat undergoes when treated with papain shows that both muscle fibers and connective tissues are slightly digested, producing a definite softening of the flesh. Bromelin, which occurs in pineapples, is a proteolytic enzyme similar to papain (from the papaya) and is about as effective in tenderizing meat.

Keep Trucks Rolling

AMERICA'S TRUCKS — KEEP 'EM ROLLING. Published by the Office of Defense Transportation, Washington, D. C., 1942. 14 pages; 5¾x9 in.; paper. Free?

Because of the importance of our five million motor trucks to the war effort, it is the patriotic duty of every truck operator to make his vehicle and tires last longer. How to do this is told in this pamphlet. Every truck owner and truck driver should read it.

Technical Data, Equations

TECHNIDATA HANDBOOK. By Edward Lupton Page. Published by the Norman W. Henley Publishing Co., 17–19 West 45th St., New York, N. Y., 1942. 64 pages, 5½x8¾ in.; paper and spiral wire binder. Price, 1; with cloth binding, $1.50.

This little handbook puts at your fingertips a lot of fundamental information of the sciences of mathematics, physics, chemistry, and engineering. Its purpose is to put into one convenient volume the basic equations, laws and data ordinarily employed by engineers and technologists. The author compiled this information to save the time required to look through several different technical books for data and equations relating to different branches of the sciences.

Trade Associations

TRADE AND PROFESSIONAL ASSOCIATIONS OF THE UNITED STATES, by C. J. Judkins. Published by the U. S. Department of Commerce, 1942. 324 pages; 9½x11½ in.; paper. Price, 70 cents; for sale by Superintendent of Documents, Washington, D. C.

Listed in this directory of trade and professional associations are 3,100 national and interstate organizations, including associations in the food industries.

Data are given on the approximate size of staff and membership of each association, as well as the principal services offered to members. In addition to being listed alphabetically, the associations are catalogued by cities and by commodities. In wartime, trade and professional associations fill an even more important rôle than in peacetime, as they are utilized for national mobilation activities and for disemmination of important information in their respective fields.

Fish Fat Studied

THE COMPOSITION OF THE DEPOT FATS OF AQUATIC ANIMALS. By J. A. Lovern. Published by H. M. Stationery Office, London, 1942. Distributed in America by British Information Services, 30 Rockefeller Plaza, New York, N. Y. 72 pages; 6x9½ in.; paper. Price, 45 cents.

The depot fats are the fats utilized as reserves of energy. In fish, the amount of this fat varies widely, not only from species to species but also within a species. This report describes the methods of analysis employed, gives the components and structure of the fats and discusses the biochemical aspects.

PATENTS

Cereals, Cereal Germs, Legumes, Nuts and Oil-containing Seeds Exploded by Sudden Release of Surrounding Steam Under Pressure at Elevated Temperatures — Sidney Musher to Musher Foundation, Inc., New York, N. Y. No. 2,282,783. May 12, 1942.

Cereals, Cereal Germs, Nuts and Oil-containing Seeds and Their Water- and Alcohol-soluble Extracts Stabilized Against Oxidative Deterioration by Exploding Into Finely Divided State Through the Release of Surrounding Steam Under Pressure and at Elevated Temperatures—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,784. May 12, 1942.

Vitamin-containing Vegetative Materials Stabilized Through Emulsification With Molasses—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,785. May 12, 1942.

Meat and Fish Meal Stabilized Against Oxidative Deterioration by Dispersion in Large Quantity of Molasses — Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,786. May 12, 1942.

Vitamin Containing Glyceride Oil Stabilized by Dispersion in Dilute Sulphurous Acid Extract of Corn—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,787. May 12, 1942.

Molasses Containing Small Quantity of Oil Soluble Vitamin Concentrate Mixed With Dried Wheat Brans and Dehydrated to Give Stable Vitamin-containing Food Product—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,788. May 12, 1942.

Oil Soluble Vitamin-containing Material Stabilized Against Oxidative Deterioration by Dispersion in Large Quantity of Concentrated Caramelized Milk-solids-not-fat—Sidney Musher to Musher Foundation, Inc., New York, N. Y. No. 2,282,789. May 12, 1942.

Glyceride Oil Stabilized Against Oxidative Deterioration by Dispersion in Small Quantities in Large Amounts of Concentrated Caramelized Milk-solids-not-fat — Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,790. May 12, 1942.

Cod Liver and Similar Vitamin-containing Oils Stabilized Against Rancidity and Oxidative Deterioration by Heating Between 250 to 375 deg. F. in Inert Gas Preparatory to Removal of Unsaponified Fraction—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,791. May 12, 1942.

Glyceride Oils Stabilized by Dispersing in a Mixture of Molasses and Inactivated Yeast or Its Water and Alcohol Soluble Extracts —Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,792. May 12, 1942.

Food Compositions Stabilized Against Oxidative Deterioration by Addition of Small Quantities of Inactivated Yeast or Its Water- and Alcohol-soluble Extracts—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,793. May 12, 1942.

Dairy Products Stabilized Against Oxidative Deterioration by Addition of Small Quantities of Yeast Inactivated or Its Water- and Alcohol-soluble Extracts—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,794. May 12, 1942.

Glyceride and Mineral Oil Blend Given Stable Vitamin Content by Mixing With Ground Dehydrated Animal Livers and Pressing to Remove Liver Solids—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,795. May 12, 1942.

Glyceride Oils and Mineral Oil Mixture Ground With Dry Legumes and Grass Preparatory to Pressing for Recovery of Vitamin-containing Oils—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,796. May 12, 1942.

Cereal Germ Oil Extracted by Grinding Dried Germ With Blend of Glyceride Oils and Mineral Oil Preparatory to Extraction by Expression—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,797. May 12, 1942.

Food Composition Stabilized Against Oxidative Deterioration by Addition of Small Quantity of Finely Divided Sprouted and Germinated Cereals, Cereal Germs, and Seeds or Their Water- and Alcohol-soluble

Extracts—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,798. May 12, 1942.

Dairy Products Stabilized Against Oxidative Deterioration by Addition of Small Quantity of Finely Divided Sprouted and Germinated Cereals, Cereal Germs, and Seeds or Their Water- and Alcohol-soluble Extracts—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,799. May 12, 1942.

Glyceride Oils Stabilized by Addition of Small Quantities of Caramelized Milk-solids-not-fat—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,800. May 12, 1942.

Fruits and Vegetables Stabilized Against Oxidative Deterioration by Treating With Small Quantities of Caramelized Milk-solids-not-fat—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,801. May 12, 1942.

Roasted Coffee Stabilized Against Deterioration by Addition of Small Quantities of Caramelized Milk-solids-not-fat in Aqueous Dispersion Immediately Following Roasting While Beans are at Temperature in Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,802. May 12, 1942.

Oats, Wheat, Corn and Rice Flakes Stabilized Through Addition of Small Quantity of Caramelized Milk-solids-not-fat in Aqueous Suspension, Heating to Over 180 Deg. F. During Flaking Operation and Drying at Finishing Temperature Between 375 and 625 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,803. May 12, 1942.

Cereal Germs Treated With Small Quantity of Caramelized Milk-solids-not-fat and Heating During Flaking, Followed by Further Heat Treatment to Between 400 and 600 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2.282,804. May 12, 1942.

Vegetables Stabilized Against Oxidative Deterioration by Coating With Polish Made to Contain Small Quantities of Caramelized Milk-solids-not-fat — Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,805. May 12, 1942.

Oils Stabilized Against Oxidative Deterioration Through Dispersed Addition of Small Amount of Finely Divided Seed and Heating to Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,806. May 12, 1942.

Animal Fats Stabilized Against Oxidative Deterioration Through Addition of Finely Divided Seed During Rendering at Temperature of at Least 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,807. May 12, 1942.

Essential Oils Stabilized by Homogenizing With Carbohydrate-containing Fiber-free and Starch-free Extract of Cereal Having Low Oil and Low Lecithin Content—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,2,282,808. May 12, 1942.

Oils Stabilized Against Oxidative Deterioration Through Addition of Small Quantities of Finely Divided Spice Residues or Their Alcohol-soluble Extracts and Heating Oil to Temperature in Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,809. May 12, 1942.

Oils Stabilized Against Oxidative Deterioration Through Addition of Small Amount of Water-soluble Carbohydrate and Aromatic Organic Chemical Agent With Heating to Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,810. May 12, 1942.

Oils Stabilized Against Oxidative Reductions by Addition of Small Amount of Trihydroxy Aryl Compound and Heating in Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,811. May 12, 1942.

Oils Stabilized Against Oxidative Deterioration by Addition of Small Amount of Polycarboxy Aliphatic Acids or Their Salts and Heating in Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,812. May 12, 1942. 1942.

Oils Stabilized Against Oxidative Deterioration by Addition of Phosphatides, Phosphoric Acid, or Salts of Phosphoric Acid and Polycarboxy Aliphatic Acids or Their Salts and

DO YOU USE ANY OF THIS EQUIPMENT IN YOUR PLANT?

DOUGH MIXERS
STEAM JACKETED COOKERS
CREAM BEATERS
CANDY COOLING SLABS
BREAD COOLERS
BLANCHERS
STEAM TABLES
MILK COOLING VATS
BOTTLE WASHING MACHINES
CAN WASHING MACHINES
HEAT EXCHANGERS
AMMONIA CONDENSERS
WATER COOLED COMPRESSORS
DISH WASHING MACHINES

QUESTION NO. 1

Can you get replacement of any food or processing unit easily, when you want it?

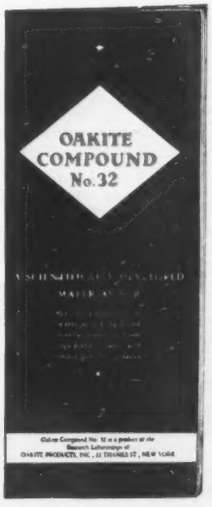
QUESTION NO. 2

What are you doing to make existing water-cooled or steam-jacketed equipment last longer?

If you use any of the water-cooled, steam-jacketed or other equipment listed above and cannot replace it, or are interested in extending its useful life, let us help you solve ONE problem common to ALL such equipment. It is the removal of lime scale and rust deposits. They prevent proper heat transfer between surfaces, impair efficient functioning of units, shorten their life. But all these units listed above can be quickly, successfully descaled with

OAKITE COMPOUND NO. 32

This widely used, effective Oakite material removes lime scale and rust deposits from ALL types of equipment, does it without harming surfaces, restores normal heat transfer, increases operating efficiency . . . does it at surprisingly low cost!



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OAKITE PRODUCTS, INC.
26G THAMES ST., NEW YORK, N. Y.

Representatives in All Principal Cities of the U. S. and Canada

Heating to Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,813. May 12, 1942.

Oils Stabilized Against Oxidative Reduction by Addition of Small Amount of Water-soluble Carbohydrate and of Protein or Amino Acids and Heating to Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,814. May 12, 1942.

Oils Stabilized Against Oxidative Deterioration by Addition of Phosphatides, Phosphoric Acid or Salts of Phosphoric Acid and Organic Nitrogen Compounds and Heating to Excess of 250 Deg. F.—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,815. May 12, 1942.

Glyceride Oils Stabilized Against Decomposition During Storage Through Addition of Less Than 5 Percent of Finely Divided Unbleached Peanut Germ or Its Water and Alcohol Soluble Extracts—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,816. May 12, 1942.

Refined Soya Oil and Refined Wet Processed Corn Germ Oil Stabilized Against Reversion After Deodorization by Addition of Small Proportion of Crude Dry-process Corn Germ Oil—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,817. May 12, 1942.

Cereal Germ and Salt-cured Sesame Seeds or Peanuts Blended for Stabilization of Cereal Germ Against Oxidative Deterioration—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,818. May 12, 1942.

Hydrogenated Shortening Given Desirable Flavor and Odor and Improved Frying and Baking Characteristics by Addition of Small Amount of Salt-cured Ground Peanuts or Soy Beans—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,819. May 12, 1942.

Peanuts and Soy Beans Treated With Common Salt and Pressed for Recovery of Oil With Highly Stabilized Properties—Sidney Musher, to Musher Foundation, Inc., New York, N. Y. No. 2,282,820. May 12, 1942.

Antiscorbutic Vitamin Product Recovered From Oily Fraction of Alfalfa—Charles G. King, to University of Pittsburgh, Pittsburgh, Pa. No. 2,282,969. May 12, 1942.

Potatoes and Vegetables Sliced by Plunger-acting Mechanism Carrying Knife Block—Sidney Bakewell, Detroit, Mich. Nos. 2,283,029 and 2,283,030. May 12, 1942.

Thin-boiling Gelatinized Starch Stabilized Upon Cooling to Room Temperature By Addition of ½ to 1 Per Cent of Sulphated Higher Fatty Alcohol—George V. Caesar, Staten Island, N. Y., to Stein, Hall & Co., Inc., New York, N. Y. No. 2,283,044. May 12, 1942.

Breakfast Cereal Made From Dried Figs, Ground Screened Whole Wheat, Wheat Farina, Wheat Germ, Salt and Sugar.—Lawrence M. Yingling, Gibsonia, Pa. No. 2,283,115. May 12, 1942.

Citrus Fruits Freed From Outer Peel Surface Preparatory to Expression of Juice—Bailie N. Savage, Seattle, Wash. No. 2,283,290. May 19, 1942.

Biscuits and Cookies Formed on Machine Having Apertured Die-plate for Receiving Flat Dough Sheet, Head-plate Mounted for Flatwise Reciprocating Action Over the Die-plate, Series of Spaced Cylindrical Open-bottom Punch-members With Removable Projections Spaced to Operate in Relation to Apertures of Die-plate to Give Dough Portions of Predetermined Design—Walter A. Thum, to Papendick, Inc., St. Louis, Mo. No. 2,283,298. May 19, 1942.

Raisins and Similar Dehydrated Fruits Subjected to Treatment With Fatty Substance to Give Distended, Crisp and Porous Condition Without Material Change in Physical and Chemical Structure of Original Fruit Solids—Wells Alan Webb, Albany, Calif. No. 2,283,302. May 19, 1942.

Fresh Fruit Handled on Roller Conveyor Designed to Eliminate Damage Caused by Bruises or Physical Distortion—Arthur F. Kalmar, Riverside, Calif., to Food Machinery Corp., San Jose, Calif. No. 2,283,372. May 19, 1942.

Multi-layer Cake With Plastic and Flowable Filling Packaged in Band Snugly Fitting Cake and Conforming to Edges of Layers to Prevent Confection Filling Flowing Past Outer Edges of Cake Lakers—John MacManus, Yonkers, N. Y., to Cushman's Sons, Inc., New York, N. Y. No. 2,283,380. May 19, 1942.

Ice Cream Made in Continuous Manner in Machine Fitted With Agitator Supported for Movement Within Chamber from Door at One End to Maintain Predetermined Radial Position—Arthur H. Boileau, Cedar Rapids, Iowa, to Cherry-Burrell Corp., Wilmington, Del. No. 2,283,487. May 19, 1942.

Edible Vitamin-fortified Food Ingredient Made by Incorporating Rich Fat-soluble Vitamin Material Into Substantially Oil-free Oil-bearing Seed Meal and Drying to Desired Moisture Content.—André E. Briod, Belleville, N. J., and Bernard A. Dombrow, New York, N. Y., to National Oil Products Co., Harrison, N. J. No. 2,283,531. May 19, 1942.

Germ-containing High-extraction Flour Made From Wheat Grains Freed of Cellular Parts of Bran and Having Lower Moisture Content Than When Ordinarily Milled for White Flour—Glenn H. Perrigo, to Victor Flour Mills, Inc., Pittsford, N. Y. No. 2,283,571. May 19, 1942.

Copra Freed of Its Fat Content Treated With Alcohol to Give Accentuating Agent for Essences and Food Flavors—Charles H. Stuart, Newark, N. Y. No. 2,283,589. May 19, 1942.

Green Coffee Prepared for Solvent Extraction of Caffein—Norton E. Berry, Summit, N. J., to General Foods Corp., New York, N. Y. No. 2,284,033. May 26, 1942.

Sugar Solutions Purified by Formation of Acid Soluble Flocculent Precipitate Which is Removable From Solution by Filtering and From Filter-aid by Acid Wash.—Robert Boyd, Vancouver, British Columbia, Canada. No. 2,284,122. May 26, 1942.

Whole Grain Core Treated With Alkaline Solution to Remove Germs, Tip-Caps and Hulls and to Give Whole Kernel Final Product Substantially Free From Corn Oil—Theodore B. Wagner, deceased, by Caroline W. Wagner, executrix, Brooklyn, N. Y. No. 2,284,239. May 26, 1942.

Filled Cylindrical Cans Mechanically Rotated While Moving Endwise in Horizontal Position—Edward C. Eberts, to Stokely Brothers & Co., Inc., Indianapolis, Ind. No. 2,284,269. May 26, 1942.

Peas, Lima Beans and Like Frozen Individually While Passing Through Rotating Perforated Drum Through Which Flows Current of Freezing Air—Edward C. Eberts and Kenneth M. Eberts; Edward C. Eberts to Stokely Brothers & Co., Inc., Indianapolis, Ind. No. 2,284,270. May 26, 1942.

Cooked Casein Made in Continuous Manner in Units Baffled to Give Compartments for Curdling, Chemically Treating and Heating, and Washing Preparatory to Discharge Through Overflow to Second Washing Tank—Vernon J. Lowe and Arthur W. Bean, Marengo, Ill., to The Borden Company, New York, N. Y. No. 2,284,435. May 26, 1942.

Variegated or Rippled Ice Cream Made on Bulk Basis—George P. Gunlach, Cincinnati, Ohio, and Byron Morris, Tuscaloosa, Ala., to Joe Lowe Corp., New York, N. Y. No. 2,284,651. June 2, 1942.

Water-absorbing Confections Packaged in Cylindrical Container Made From Wrapper of Waxed Paper Having Lining of Unwaxed Paper Wrapped Tightly Around Confectionery Product and Ends Tucked Over Ends of Confection, and of Foil Outer Wrapper. Also With Ends Tucked Over and Covering Tear Strip Secured Between Waxed Paper Wrapper and Unwaxed Lining, Leaving Projecting Loop to Outside of Foil Wrapper—William T. Martin, to Beech-Nut Packing Co., Canajoharie, N. Y. No. 2, 284,668. June 2, 1942.

Soya Meal Leached for Removal of Water Soluble and Alkali-soluble Proteins Which are Subsequently Precipitated and Dried as Purified Soya Proteins—Eric Wahlforss, Chicago, Ill., to Glidden Co., Cleveland, Ohio. No. 2,284,700. June 2, 1942.

Chewing Gum Base Made to Contain Polybutene, Resin and Wax—Frank T. De Angelis, West Brighton, N. Y., to L. A. Dreyfus Co., Staten Island, N. Y. No. 2,284,804. June 2, 1942.

Seasoning for Meats Stabilized Against Essential Oil Oxidation by Addition of Dry Powdered White Pepper and Ginger—Albert Heller, to B. Heller & Co., Chicago, Ill. No. 2,284,822. June 2, 1942.

Algae Growths in Water Cooling Towers and Spray Condensers Inhibited by Copper Napththenate—Gerald M. Fisher, Los Angeles, Calif., to Socony-Vacuum Oil Co., Inc., New York, N. Y. No. 2,284,889. June 2, 1942.

Dehydrating Carried on in Airtight Chamber Maintained at Temperature Substantially Above 212 Deg. F. and From Which Air is Withdrawn at Sufficiently Greater Rate Than Rate of Inflow to Create Relatively High Partial Vacuum—Alfred H. McComb, Chicago, Ill. No. 2,284,913. June 2, 1942.

Lollipop Confections Having Looped Handles Transferred From Molds to Conveyor in Continuous Manner by Mechanical Means—Carl W. Spohr, Chicago, Ill., to Saf-T-Pop Corp., Dubuque, Iowa. No. 2,284,928. June 2, 1942.

Bottled Beverages Packaged in Carrying Carton With Handle That Nests Between Adjacent Rows of Packages in Shipping Carton—Harold E. Rue, Wauwatosa, Wis., to Pabst Brewing Co., Chicago, Ill. No. 2,284,989. June 2, 1942.

Beverage Ingredient Mixed in Bottle by Mechanical Rotating Cradle—Leonidas L. Sewell and John J. Flynn, San Antonio, Tex. No. 2,284,991. June 2, 1942.

Bread Staling During Storage After Baking Inhibited by Addition of Small Quantity of Sorbitol to Dough Ingredients—Walter A. Taylor, Tamaqua, Pa., to Atlas Powder Co., Wilmington, Del. No. 2,285,065. June 2, 1942.

Butter Made in Churn Operated Under Partial Vacuum—Robert D. Pike, Piedmont, Calif., to A. W. Stitt, San Francisco, Calif. No. 2,285,124. June 2, 1942.

Canadian Patents

Fruit Split and Pitted in Machine Having Jaws Fitted With Splitting Blades in Which Cutout Portion Permits Blades to Close Around Pit of Fruit—Arthur B. McLauchlan, Salem, Ore. No. 404,472, May 5, 1942.

Shell and Flesh of Boiled or Steamed Shellfish Crushed Between Breaking Rolls and Separated by Method Based on Difference in Density—Engbert H. Reerink, Bussum, Jan Boeke, Eindhoven, and William Stevens, Weesp, Holland. No. 404,605, May 5, 1942.

Oats Steamed to Solubilize Starch Content and Reinforced With Vitamin A in Vehicle Compatible With Fat in Oats—Jorgen Petersen, Svendborg, Denmark. No. 404,610, May 5, 1942.

Pectin Treated With Ammonia Gas to Give Ammonium Pectate Which Forms Gel in Aqueous Solution by Action of Lactone Hydrolyzing to Weak Acid—Lacey H. Evans and Louis J. Huber, to General Mills, Inc., Minneapolis, Minn. No. 404,707, May 12, 1942.

Bread Sliced in Machine Having Series of Band Saws and Multiple Saw Guide With Splined Main Shaft Parallel to Reversely Threaded Auxiliary Shaft—Kurt W. Kuban, to Battle Creek Bread Wrapping Machine Co. No. 404,811, May 19, 1942.

Egg Meats Removed by Machine Which Punctures Shell With Hollow Needle and Sucks the Contents Into Container—Harold H. Cribb Glenside, South Australia. No. 404,943, May 26, 1942.

Milk Pasteurized by Flash Heating Above 140 Deg. F. Followed by Flash Cooling; Operation Takes Only About 20 Sec.—Arthur C. Dahlberg and Robert F. Holland, Geneva, N. Y., to Cornell Research Foundation, Inc., Ithaca, N. Y. No. 405,275, June 9, 1942.

Honeycomb Uncapped While Moving on Endless Conveyor Past Adjustable Uncapping Devices—John W. McFadyen, Tiverton, Ont., to F. W. Jones and Son, Bedford, Que. No. 405,302, June 9, 1942.

Milk Heat-Treated in Apparatus Having Pasteurizer, Deodorizer and Cooler Grouped Around Central Condenser—Henry L. Murray, to Murray Deodorisers, Ltd., Auckland, New Zealand. No. 405,322, June 9, 1942.

Fish Graded in Machine With Inner Slotted Drum Surrounded by Outer Slotted Drum; Drums are Rotatable While Locked Together With Slots in Desired Relative Positions—Paul J. Cote and Chas. H. Gillespie, to British Columbia Packers, Ltd., No. 405,449, June 16, 1942.

meets WETNESS *without* WEAKNESS

G-E TRI CLAD
REG. U.S. PAT. OFF.

SPLASHPROOF MOTOR

IN milk and food-processing plants, wetness strongly attacks motors at two principal points—on the frame, where paint has been rubbed or knocked off, and at the coils, where moist air often deposits water.

Tri-Clad splashproof motors can meet these attacks without weakness, day after day, because of these features:

Their frames and end shields are *cast iron,* a material that powerfully resists rust and corrosion.

Their coils are wound with Formex* wire, which is so tough that no wrappings of cotton (which might absorb water) are necessary. The insulation of Formex wire is essentially unaffected by water. In addition, Tri-Clad windings are firmly bonded together by a moisture-resistant, synthetic-resin varnish and are protected by a coat of tough, lasting Glyptal.

Because Tri-Clad splashproof motors are so well protected against damage from wash water, germicidal solutions, and steam, they will give you long service even under trying conditions.

They are available up to 20 hp in splashproof construction. An equivalent cast-frame, splash-resisting construction is available in larger sizes. Ask your G-E representative for more details.

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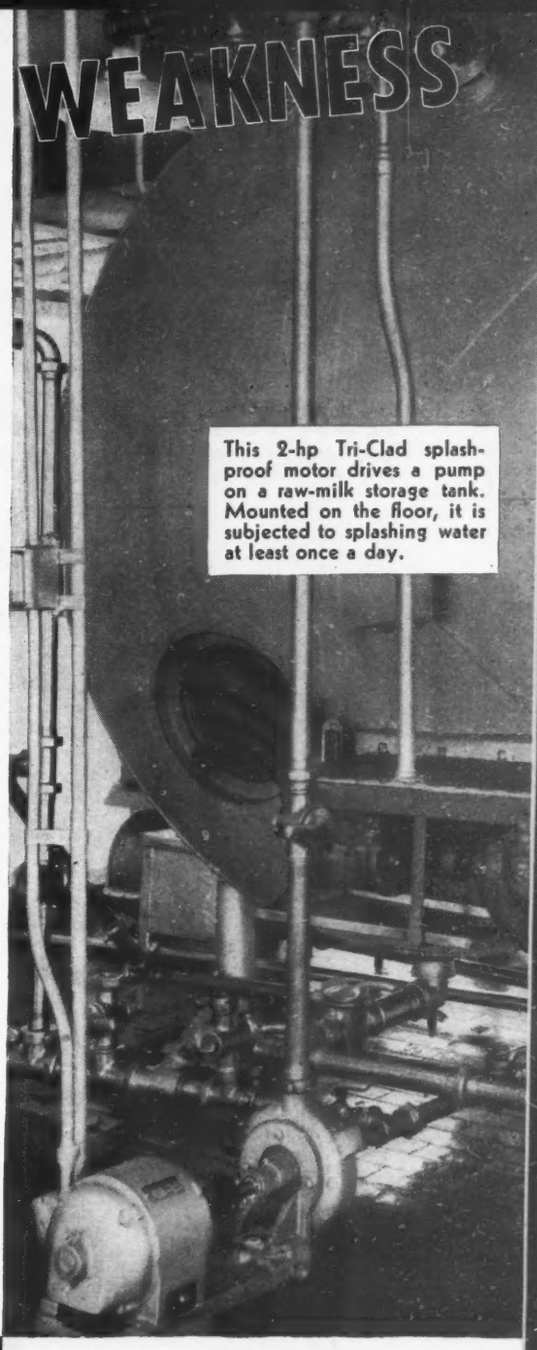
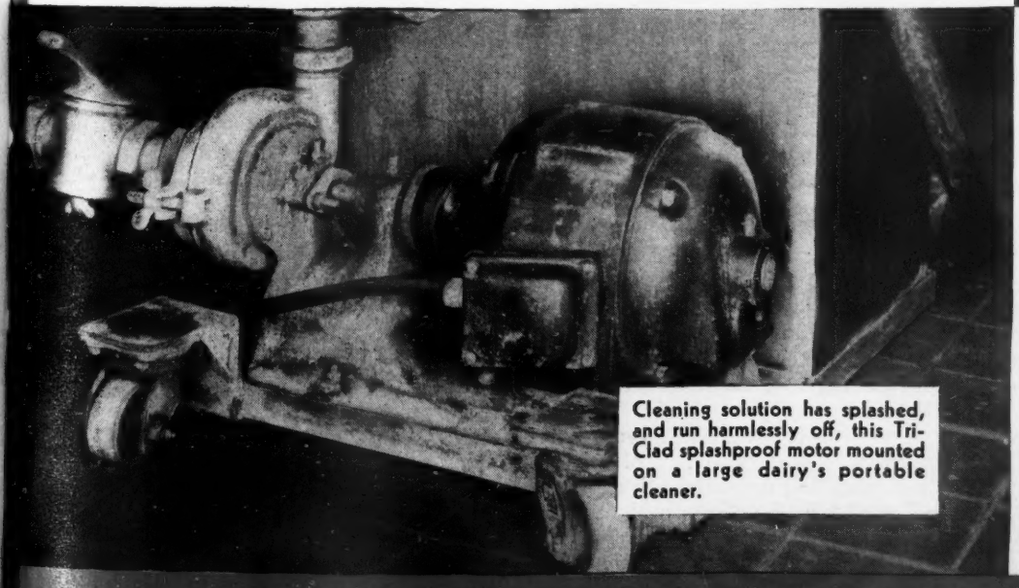


This 2-hp Tri-Clad splashproof motor drives a pump on a raw-milk storage tank. Mounted on the floor, it is subjected to splashing water at least once a day.



Cleaning solution has splashed, and run harmlessly off, this Tri-Clad splashproof motor mounted on a large dairy's portable cleaner.

4 THINGS TO DO TO GET MOTORS FASTER

1 USE STANDARD MOTORS. Wherever possible, select standard, open, sleeve-bearing motors. Building fewer "specials" means faster and greater production of motors.

2 PLACE ORDERS EARLY. Order the motors when you order, or plan for, the equipment they are to drive.

3 SEND PROPER PRIORITY. Be sure correct priority papers accompany your order and that the priority rating reflects the urgency of the motor's use in the war effort.

4 CHECK G.E. FOR WAREHOUSE STOCKS. A supply of many standard motors is kept on hand to meet urgent war needs.

AND REMEMBER—keep the motors you have in top-notch shape. *General Electric, Schenectady, New York.*

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Letters to the Editor

Fat Removal Does Not Lessen Alkaloid Content

To the Editor
of FOOD INDUSTRIES:

There are a number of errors in the article on Facts About Caffeine, Theobromine in Foods, in the March issue by Dr. P. W. Punnett.

One is an obvious misprint where it is stated that there are 5.8 grains of caffeine in "cola" beverage "A" where only 0.58 grain is intended.

Another error is in a statement that in the case of cacao products the amounts of caffeine and theobromine vary widely—"apparently the removal of fat from chocolate results in the removal of some of the caffeine and theobromine."

The pressing of butter from cacao nibs removes only traces of these alkaloids. Even if a solvent is used to remove butter, this is also true.

Our analysis of a well-known baking chocolate square (56 percent fat) gave 1.37 percent theobromine and .12 percent anhydrous caffeine equivalent to .13 percent U.S.P. (hydrous) caffeine. Our analysis of a breakfast cocoa (22.5 percent fat) made by the makers of the sweet milk chocolate bar analyzed by Dr. Punnett gave 2.5 percent theobromine and .22 percent anhydrous caffeine equivalent to .24 percent U.S.P. (hydrous) caffeine. Analysis of other edible cocoas has shown no great variation from this ratio. Thus the ratio of hydrous caffeine to theobromine is slightly under 10 percent of the latter. Our analysis of the brand of sweet milk chocolate used by Dr. Punnett gave .22 percent theobromine instead of .306 percent chloroform extraction method; instead of .445 percent tethachlorethane extraction.

Using the above ratio of approximately 10 percent for the caffeine present, this would show only .022 percent U.S.P. caffeine in the sweet milk chocolate bar instead of .06 to .08 percent as calculated from Dr. Punnett's data.

Thus it would take three 3½-oz. sweet milk chocolate bars rather than one to equal the caffeine in a cup of tea or coffee.

The presence of other nitrogenous compounds in the milk chocolate must have given high results by Dr. Punnett's method of analysis. We believe the column at the right (Table I) would more nearly represent the amounts of hydrous-caffeine and theobromine in cacao products. (64.8 milligrams equal one grain.)

DR. FRANK E. CARRUTH
Maywood Chemical Works, Maywood, N. J.

Cacao Products Table I

	Dr. Punnett Caffeine, Theobromine (Milligrams)		Our data Caffeine, Theobromine (Milligrams)	
Breakfast cocoa (5 oz. cup)	1.1	55.1	7	70
Baking chocolate (5 oz. cup)	7.8	125.7	13	130
Sweet milk chocolate (3½ oz. bar)				
Chloroform extraction	58.1	301.4	21	219
Tetrachlorethane extraction	78	439.0	18	180
Sweet milk chocolate 3½ oz. brand A			55	550
Semi-sweet chocolate 3½ oz. brand A			49	490
Semi-sweet chocolate 3½ oz. brand B				

It's the Little Things That Count

(*Continued from page 44*)

highly refined and very pure salt produced a more tender canned pea or, for that matter, any other vegetable or fruit which is rich in pectin. Incidentally, because the pectins tend to be more concentrated in the skins, the greatest effect of this calcium is upon the skin.

You will be interested, I am sure, in the fact that the effect of calcium on pectins and on proteins is a reversible one. I have definite evidence that indicates that pectins and proteins act like the zeolite base exchanger commonly used in water softening equipment. It is possible to remove calcium from canned vegetables and from canned shrimp by processing in a pure brine made with pure salt and soft water. Not only is calcium removed by this "regeneration" process, but also magnesium is removed. I am at present following this calcium and magnesium removal from canned shrimp, and our data show that significant amounts of calcium and magnesium are building up in the process brine as the samples age.

I should like to call your attention particularly to the fact that rancidity development is, for the most part, an oxidation reaction. The other two

forms of rancidity development are only met with infrequently. Let me point out that in foodstuffs, we have finely divided fats of varying degrees of susceptibility. These fats are frequently in an emulsion form and thus a relatively large surface is exposed to the effects of oxygen, light and oxidative catalysts. It requires exceedingly minute traces of oxidizers materially to affect the rancidity resistance of fats.

In running the cabinet test for estimating the rancidity resistance of shortenings, it has been suggested that the glassware used should never be cleaned with cleaning solution of the dichromate type, commonly used in cleaning laboratory glassware. Apparently, it is very difficult to remove, even by multiple rinsing with distilled water, those last faint traces of oxidizing material and even that infinitesimal amount that still remains on the glassware materially affects the length of time required for a given shortening to turn rancid. This leads me to the last point that I should like to call to your attention, namely, the fact that substances may be held adsorbed on the surface of equipment whether it be constructed of metal, glass or other vitreous materials.

It is not an easy task to really clean a piece of equipment. Long after the equipment looks clean, it may still hold, bound to the surface, a monomolecular film of contaminating material which can be removed only with the greatest difficulty. If you suspect, therefore, that contamination is causing trouble in a food process, it may well be that more efficient cleaning methods will point the way out of your difficulty. You will recall that I indicated that the first batch of butter has less keeping quality than subsequent batches. In spite of the fact that the equipment was probably "thoroughly" cleaned, it required a batch of butter to absorb that last faint trace of contaminating material that could not be seen. But it was there just the same, bent on its evil task.

Yes, indeed, it is the little things that count in food technology. It is the unseen things and even the things that the text books will tell you do not exist, that may bob up at any time to interfere with the maintenance of quality in processed foods. So, let us make up our minds to be on the lookout for these little things that count, bearing in mind that the wide-awake food technologist is a "Doubting Thomas," looking for things that aren't there—things that "couldn't happen," but do just the same. So, let's not close our minds, secure in the knowledge that published data in the scientific literature and in the text books, tell us that something *is* so, when it may be that actually it "*just ain't so.*"

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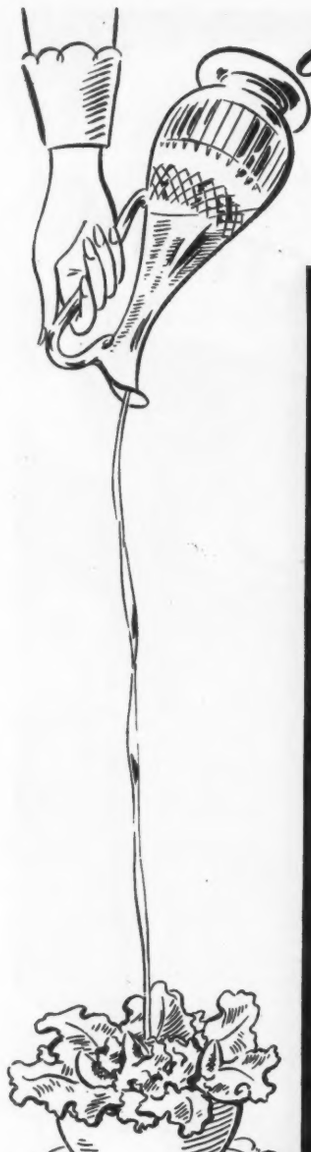

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MORE and more attention is being directed to the need for an adequate supply of vitamins in America's war-time diet... and the salad bowl figures prominently in that picture.

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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

PRESERVATIVES

Toxicity Of Food Preservatives

SPOILAGE of foods by microorganisms can be prevented by chemical preservatives, but many of these are poisonous to humans. Only one, sodium benzoate, is in common use. A preservative may not be immediately poisonous, but may work slowly and cumulatively. When we know just what happens to the preservative in the body, we can judge how toxic or how safe it is. Thus sodium benzoate in limited amounts is changed to benzoic acid which combines with glycine stored in the body tissues to form hippuric acid, in which form it is excreted in the urine.

Using white rats and measuring the rate of gain in growth against controls, tests were made on (1) sodium benzoate, alone and with added glycine, (2) sodium and calcium propionates (used in bread, and to a limited extent in process cheese, to control mold), (3) Zephiran, a new germicide, consisting of high molecular alkyldimethylbenzylammonium chlorides. This last comes in 10 percent water solution and is diluted 1 to 5,000 or 10,000 for sterilizing dairy equipment.

By this method the use of up to 3 percent of the propionates or of Zephiran, or 1 percent of benzoate, in the rats' diet caused no ill effects or slowing of growth. With 3 percent benzoate there is definite poisoning, although added glycine helps combat this. Previous feeding with small amounts of benzoate builds up a tolerance for the larger doses.

Digest from "Report of a Study on the Toxicity of Several Food Preserving Agents," by K. E. Harshbarger, *Journal of Dairy Science*, vol. 25, 169-174, February, 1942.

QUALITY CONTROL

Spice Contamination

IMPORTED spices are usually heavily contaminated with bacteria. An appreciable reduction in bacterial count may result through mechanical removal during screening. But practical handling of the problem depends upon sterilization, and the manufacturers in this country must develop and apply their own control measures.

Black pepper was used as the test spice because of its high contamination and its wide use. Thermal sterilization is usually effective under relatively mild conditions. The loss in flavoring power due to moist heat sterilization was about 10 percent, but probably prevention of spoilage losses more than offsets this. Ethylene oxide is particularly effective, apparently due to a true germicidal property. Ethylene glycol was much less effective. Ethyl formate is only moderately effective. Formaldehyde is especially effective against spores. Ultraviolet light and ethyl ether proved to be ineffective.

A tabulation is given of bacterial counts on many varieties of spices, including allspice, cloves, cinnamon, cardamom, mustard, celery seed, onion powder and several varieties of pepper.

Digest from "Spice Contamination and its Control," by J. Yesair and O. B. Williams, *Food Research*, vol. 7, 118, 1942.

BEVERAGES

New Juice Extractor

A COMPLETELY automatic fruit juice extractor which is claimed to produce citrus juice retaining its natural color, flavor, aroma and nutritive value, without contamination by undesirable rind oils or substances from the surrounding tissues, and without excessive aeration, uses a slow-speed, relatively soft and pliable reamer to produce a gentle rubbing action, without pressure. The fruit is cut only at one end to avoid cutting the seeds or exposing the pulp to the air.

Digest from U. S. Patent 2,274,306, issued February 24, 1942, to Ralston R. Smith, of Vallejo, Calif.

Suspension Agent For Chocolate

QUINCE seeds are treated to produce an extract which has unique properties for holding chocolate particles in suspension in milk or other liquid. The material is described as a mucilage, not a pectin.

The seeds are agitated in water for 4 or 5 hours at about 145 deg. F., then screened out of the thick extract, from which the mucilaginous product is precipitated by adding a suitable agent, such as isopropyl alcohol. The precipitate is dried and powdered. The suspension is claimed to have the same physical properties hot and cold.

Digest from U. S. Patent 2,267,624, issued December 23, 1941, to A. E. Siehrs, Chicago, Ill., and assigned to Krim-Ko Co.

Fruit Juice Products

IN PRODUCING juice from fruits, hot extraction usually gives the highest yield of juice, retains the color best and produces juice with the highest viscosity. Cold extraction is superior in flavor retention. Freezing extraction, which can be successfully applied to a few fruits such as strawberries and raspberries, approaches hot extraction in yield, color and viscosity. Juice extracted by the freezing method has a typical cold-pressed flavor. Clarification must be practiced with care because it tends to impair viscosity, and sometimes flavor. Pasteurization of deaerated juices inactivates the enzymes and kills microorganisms. High temperature pasteurization (above 180 deg. F.) imparts a "cooked" flavor to some juices, especially apple and grape juices. In strawberry and raspberry juices, high-temperature pasteurization has more effect on color than on flavor. A temperature as low as 150 deg. F. will kill most of the organisms in fruit juices. As a rule the fruits grown in the Northeastern states are sufficiently acid to prevent growth of spore-forming bacteria, and their juices are successfully treated by mild pasteurization.

Digest from "Processing and Storage of Fruit Juices," by Carl S. Pederson, H. G. Beattie and E. A. Beaven, *Proceedings of the Institute of Food Technologists*, 1941, p. 75.

DAIRY PRODUCTS

Rancid Cheddar Cheese

THE enzyme lipase, naturally present in milk, at times gives rise to a rancid flavor in cheddar cheese. Lipase can be made inactive by copper (1 to 8 parts per million) provided the milk is also aerated. The lipase thus inactivated by oxidation may be reactivated by suitable reducing agents. These include the absence of air or oxygen (as in the interior of a cheese) and the presence of cysteine. This last is a typical sul-

phur-containing amino-acid which will be present in cheese as soon as three days after manufacture, as a result of the casein breaking down in ripening. Ascorbic acid, a normal constituent of milk, which might be expected to act likewise, did not give any clear cut results.

Digest from "The Reversibility of Oxidative Inactivation of Milk Lipase in Relation to its Activity in Cheddar Cheese," by I. Hlynka and E. G. Hood, *Journal of Dairy Science*, vol. 25, 111-115, February, 1942.

Salting Gathered Cream

THE addition of 10 to 13 percent of salt to cream, which may be held at Kansas summer temperatures for ten days before churning, gives 90 to 92 score butter, while unsalted cream yields only 86 to 89 score butter. Bacterial growth is definitely retarded, especially acid-forming types, and yeasts and molds do not develop. For farm use all the salt may be added to the can the first day, provided the contents are thoroughly agitated when cream is added on subsequent days. There are, however, two objections to salting. Dairy metal and tinned copper are noticeably corroded, so that stainless steel cans are necessary. Further, the process must be accepted by regulatory officials and creamery operators before being generally adopted by the cream producers.

Digest from "Further Studies on the Use of Salt for Improving the Quality of Cream for Buttermaking," by F. E. Nelson, W. J. Caulfield and W. H. Martin, *Journal of Dairy Science*, vol. 25, 59-70, January, 1942.

FATS AND OILS

Fat Spoilage

CHLOROPHYLL is prooxygenic, and when it occurs in vegetable oils it tends to accelerate spoilage by oxidation. Removing the chlorophyll is not an entirely satisfactory expedient because antioxygens are removed at the same time. Crude chlorophyll is less actively prooxygenic than pure chlorophyll. The antioxygen responsible for this difference has not yet been identified, but is known not to be xanthophyll. When poppyseed oil is clarified by filtering through a solid absorbent, it becomes more sensitive to oxidation, presumably by loss of a natural anti-oxidant. Cucumber seed oil, lard and olive oil are not sensitized to oxygen by the same clarification treatment. Liver catalase (aqueous liver extract) is distinctly antioxygenic in oils, but not in direct proportion to its catalase activity. The active factor is not catalase itself but an accompanying factor which can also be extracted from liver by oils.

Digest from "Chemistry of Fat Spoilage. IX. Influence of Chlorophyll and Xanthophyll. X. Effect of Catalase," by K. Taufel and R. Muller. *Biochemische Zeitschrift*, Vol. 304; 137, 275, 1940 (Published in Germany).

New Antioxidant for Lard

SAMPLES of lard containing Southern Sweet Gum (liquid-amber Styraciflua) had an aromatic odor and flavor which could undoubtedly be removed by steam deodorization. Accelerated stability tests on two samples indicate that this native American gum has some use as a stabilizer, in relatively small percentages. It is proposed to do further work to check its value as an antioxidant and to determine whether or not it can be used in edible fats under the food laws.

Digest from "Use of Southern Sweet Gum as an Antioxidant in Lard," by W. G. McLeod, presented at the Fall meeting of the American Oil Chemists Society, Chicago, October, 1941.

MEATS

Palatability of Chicken

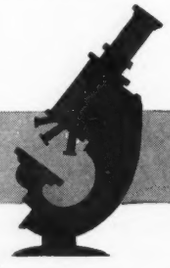
CHANGES in palatability of chicken in cold storage have been investigated in relation to histological changes. The first drop in aroma and flavor ratings began after 40 hours at 35 deg. F. and continued thereafter. Tenderness of the breast increased rapidly up to 3 hours. Tenderness of the thigh took 42 hours to rise to the rating reached by the breast in 3 hours. Juciness was not influenced by storage time. In breast muscle and thigh muscle the first change was the appearance of nodes and internodes characterizing *rigor mortis*. Finally the striated muscle structure changed to a granular structure.

Digest of "Palatability and Histological Changes Occurring in New York Dressed Broilers Held at 1.7 deg. C. (35 deg. F.)," by Helen L. Hanson, G. F. Stewart and Belle Lowe, *Food Research*, vol. 7, 148, 1942.

MISCELLANEOUS

Casein from Skim Milk

AN improved procedure in the lactic fermentation method for making casein from skim milk is to effect the coagulation in a steam-jacketed kettle fitted with a mechanical stirrer. Water is circulated through the jacket to maintain



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an even temperature of 28 deg. C., and 4 to 8 percent of enzyme is intimately mixed with the milk by means of the stirrer. After standing overnight the curd is warmed to 34 deg. C. and cut with a wire screen or the like. The whey is drawn off and the curd is washed three times with water (half the original volume of skim milk). The last wash water is left in contact with the curd 30 minutes, with occasional stirring. Pressing is effected slowly, starting at a low pressure but increasing slowly for at least 4 hours. The pressed curd contains about 50 percent water. After artificial or sun drying to 12 percent moisture, it will keep for years if properly protected. The yield is approximately 3 percent of the original weight of skim milk.

Digest from "Casein Production," by A. B. Andersen, Ceres, vol. 3, 126, 1941 (published in Brazil.)

Paper Milk Containers

PAPER mills which make an earnest and systematic effort to meet requirements as to bacterial counts of their milk-container products have no serious difficulty in complying with public health regulations. Even the problems of thermophilic and spore-forming bacteria have been successfully solved in mills where such organisms are troublesome. Calender water, though a potential cause of high bacterial count of container papers, is a controllable source of contamination which needs to be watched but not feared. Another source of bacteria which calls for special attention is the slime which sometimes collects in gelatinous masses by growth of microorganisms in paper stock. These slimes partially protect bacteria from ordinary treatments, but their protection can be broken down. Microbiological problems vary widely in different paper mills but there is always an effective remedy.

Digest from "Public Health Compliance by Manufacturers of Paper for Packaging Perishable Foods," by J. R. Sanborn, *Journal of Milk Technology*, vol. 5, 88, 1942.

Ice Cream Freezer

DESCRIBED in U. S. Patent 2,268,551 is a method for freezing ice cream and like products rapidly in a continuous flow, and in a minimum amount of time, thereby producing a more uniform texture of the product itself. The rapid freezing prevents the forming of large crystals in the product and thus produces ice cream of fine texture. The product is discharged in a hardened and finished condition, eliminating the use of large storage coolers for hardening rooms and the resultant loss of time in hardening the product.

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Quick Freezing Offers Wartime Economies

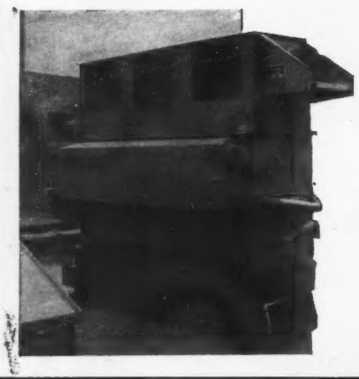
(*Continued from page 50*)

Since vitamins are one of the outstanding values of vegetables, this is frequently a serious loss.

On the other hand, vegetables canned or quick frozen undergo no great loss of food value other than the loss incurred in processing. Such processing losses are entailed through the application of heat, and this is the least for quick freezing. Furthermore, processed vegetables require less heat for cooking, and consequently suffer less vitamin loss in their final preparation, making them compare favorably with the fresh product.

In quality, quick frozen vegetables more nearly approach garden fresh vegetables than products distributed under any other system. The time between harvesting and quick freezing is short. The crop is taken from the field directly to the processing plant, trimmed, sorted, graded, cleaned, blanched, packed and frozen immediately. It then remains in this preserved state until it reaches the consumer. The research work of food technologists such as D. K. Tressler, C. R. Fellers and G. A. Fitzgerald has established the quality of quick frozen vegetables without question.

In regard to marketing value, processed vegetables are more stable than the fresh produce. And quick frozen vegetables ordinarily compete in price with fresh vegetables shipped from a distance. Frequently they are cheaper. And for those who use vegetables in large packages and large volume, the economies of quick freezing are much greater because the marketing costs are considerably less. Because of this, the institutional trade and some of the large manufacturers prefer quick frozen foods not only because of the uniformly high quality but because they are more economical.



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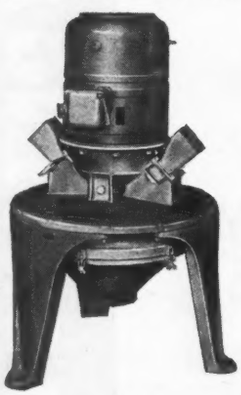

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Are you making or handling flour, cereals, spices, Granulated, Powdered, or similar free-flowing dry materials? Are you handling dehydrated products? Place the *"Entoleter"* in the production line and

Positively destroy 100% insect eggs or other forms of insect infestation

in the raw material before processing and in the finished product before packaging. Remember food is as vital to Victory as ships and planes. Protect both your products and your reputation. The *"Entoleter"* also

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Completely eliminates it! Tangible savings from this source alone frequently pay the cost of any *"Entoleter"* in a few months. We have actual plant operating records and certified laboratory tests to prove these statements.

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THE SAFETY CAR HEATING AND LIGHTING COMPANY, INC.
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How to Maintain Electric Motors

(*Continued from page 56*)

Heat can be supplied externally by placing heating units around the machine, covering with canvas, and leaving a vent at the top to permit moisture to escape. Twelve-inch fans set to blow air across the fronts of "glow heaters" and then into the lower part of a motor from opposite sides will produce excellent results.

Cleaning Motors

A systematic and periodic cleaning of motors is necessary to insure best operation. If conditions are severe, open motors might require a certain amount of cleaning each day. For less severe conditions, weekly inspection and partial cleaning are desirable.

In cleaning a motor, the heavy dirt and grease should first be removed with a heavy, stiff brush, wooden or fiber scrapers, and cloths. Rifle-cleaning brushes can be used in the air ducts. Dry dust and dirt may be blown off, using dry compressed air at moderate pressure. Care must be taken to direct the air so that dust will not be pocketed in the various corners. Grease, oil and sticky dirt are easily removed by applying cleaning liquids like carbon tetrachloride, gasoline or naphtha.

General Overhauling

Motors should generally be given an overhauling at intervals of five years or so, normally, or, if the service is more severe, more frequently. Check the motor air gap, between stator and rotor, with feelers for uniformity. Small clearance at the bottom may indicate worn bearings. Take the motor apart and in-

spect it thoroughly. Remove the waste from waste-packed bearings and rearrange or replace it.

The rotors should be cleaned with a solvent to remove any accumulated dirt, after which any rust should be removed with fine sandpaper (not emery paper). When clean and dry, the rotors should be coated with a good grade of clear varnish or lacquer to protect them from moisture. To prevent injury to the bearings, they should be completely protected with a clean rag when the motor is disassembled.

The rotors of wound-rotor motors should be given the same treatment as the stators. In addition, soldered joints and binding cords should be inspected and any weakness remedied.

The stator core should be cleaned of dirt with a solvent, and any rust should be removed with fine sandpaper (not emery paper).

Brush Inspection

The first essential for satisfactory operation of brushes on d.c. motors is free movement of the brushes in their holders. Uniform brush pressure is necessary to assure equal current distribution. Adjustment of brush holders should be set so that the face of the holder is approximately $\frac{1}{8}$ in. up from the commutator; any distance greater than this will cause brushes to wedge, resulting in chattering and excessive sparking.

Make sure that each brush surface in contact with the commutator has the polished finish that indicates good contact, and that the polish covers all of this surface of the brush.

When replacing a brush, be sure to put it in the same brush holder and in its original position. When installing new brushes, fit them carefully to the commutator. To do this, insert a strip of fine sandpaper, sand side up, between the commutator and the brush. Rotate the commutator back and forth, allowing the brushes to bear on the sandpaper only when the commutator is moving in the proper direction of rotation. The brush should be lifted so it will not touch the sandpaper on the back pull.

Check Brush Springs

Check the springs that hold the brushes against the commutator. Improper spring pressure may lead to commutator wear and excessive sparking. Larger motors have means for adjusting the spring pressure, which should be 2 to $2\frac{1}{2}$ lb. per square inch of area of brush contact with the commutator.

Roughness of the commutator should be removed by sandpapering or stoning. Never use emery cloth or an emery stone. For this operation, run the motor without load. If sandpaper is used, wrap it partly around a wood block.

If the armature is very rough it should be taken out and the commutator turned down in a lathe. When this is done, it is usually necessary to cut back the insulation between the commutator bars slightly. After turning down the commutator, the brushes should be sanded and run in.

Never put oil on the commutator.

Brief Summaries of AMS Standards

(*Continued from page 47*)

"Normal canned orange juice flavor" means that the product is free from objectionable or off flavors of all kinds.

"Free and suspended pulp" is determined by a centrifugal method described in the standards.

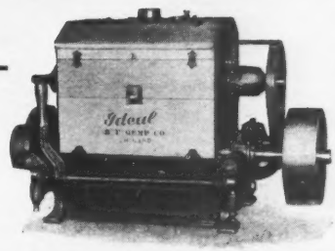
"Acid" in orange juice is determined by titration with standard sodium hydroxide solution, using phenolphthalein as indicator. Acid is calculated as anhydrous citric acid.

"Percent by volume of recoverable oil" is determined by a steam distillation method outlined in detail.

A sample score sheet is also included in the standards.

ISSUED: Feb. 5, 1942
EFFECTIVE: March 2, 1942

For clean-cut, uniform granulations with minimum powder...



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If your operations involve processes where corrosion of equipment must be avoided and product purity must be maintained, Silver-Ply Stainless-Clad may solve your problems, for it is corrosion resisting, stain-free and easy to clean.

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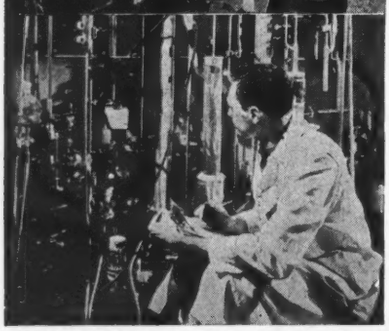
Appearing on the labels of more than 1,500 products used by customers in many fields, the name Merck has long been recognized as a dependable source of fine chemicals.

In the vitamin field also, the name Merck has been identified with leadership in the synthesis, development, and production of these vitally important substances ever since the first of the pure vitamins (ascorbic acid) was synthesized in 1934.

The synthesis of Vitamin B_1 was accomplished in the Merck Research Laboratories, thereby making the pure crystalline vitamin abundantly available for commercial use. Merck & Co. Inc. also manufactures other important vitamins, including Ascorbic Acid (Vitamin C), Niacin (Nicotinic Acid), Niacinamide (Nicotinamide), and Riboflavin (Vitamin B_2).



The growing list of Merck contributions in the vitamin field emphasizes the outstanding rôle being played by Merck chemists and their collaborators in making available these pure substances of known and uniform potency.

The Merck technical staff and laboratories offer valuable technical assistance in perfecting such factors as adequate distribution and retention of the vitamins, and product control methods.

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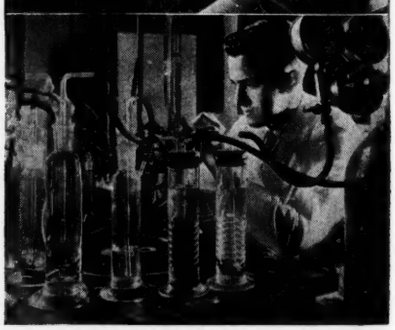

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FORMULAS FOR FOODS

FORMULA NO. 332

Prepared Gingerbread Mix

Sugar	12 lb.
Salt	4 oz.
Concentrated butter flavor	0.4 oz.
Cinnamon	8 oz.
Ginger	8 oz.
Butter	4 lb.
Totally hydrogenated vegetable shortening	12 lb.
Soda	2 lb. 8 oz.
Cake flour	64 lb.

Mixing Directions

Mix all ingredients together, except the cake flour, until a smooth blend is produced, then add the cake flour and mix until it is incorporated. This mixture may be packaged in 1- or 2-lb packs for household or institutional use, to be made up according to the directions of Formula No. 333.

Formula from Parker-Broeg

FORMULA NO. 333

Gingerbread Made From Prepared Mix

Prepared gingerbread mix (Formula No. 332)	2 lb.
Whole eggs	6 oz.
Molasses, best grade	1 lb. 8 oz.
Water	12 oz.

Mixing Directions

Place the whole eggs, molasses and gingerbread mix in the machine bowl and stir on low speed to wet. Beat one minute on high speed. Add about 3 oz. of water and mix until smooth. Continue to add water in small amounts, and each time mix smooth again, until the water is all in, then beat ½ minute on high speed.

Weigh 7 oz. into a buttered, papered-bottom loaf tin, 4x4x2½ in. Bake at 325 deg. F. with medium top and low bottom oven temperature. Bake just fairly done.

Formula from Parker-Broeg

FORMULA NO. 334

Frappe No. 1

Corn sirup	65 lb.
Standardized invert sugar	35 lb.
Albumen	1 lb.
Water (cold)	2 lb.

Method of Preparation

Dissolve albumen in water. Heat the corn sirup and standardized invert sugar to 175 to 200 deg. F. Immediately transfer the hot sirup to a marshmallow beater. Start beating, then gradually add the albumen solution and beat the batch until light.

This frappé is used in making up various candy formulas, such as Formula No. 335 below.

Formula from The Nulomoline Co.

FORMULA NO. 335

Whipped Chocolate Centers

Unsweetened chocolate (liquor)	50 lb.
Frappe No. 1 (Formula No. 334)	75 lb.
Salt	To taste
Cinnamon or rum flavor	

Directions

Melt and temper the chocolate to approximately 100 deg. F. Add the tempered chocolate to the frappé, mixing well. Add the salt and flavoring and mix thoroughly, then spread the batch out to set. During warm weather, place the batch in a cool room to accelerate setting.

These rich, plastic, smooth centers may be rolled directly in nuts, formed into sheets and cut into squares or oblongs and packed, or the centers may be coated with milk or dark chocolate coating.

Formula from The Nulomoline Co.

FORMULA NO. 336

Barbecued Hams

Bay leaves	1 oz.
Cloves	1 oz.
Black pepper	2 oz.
Nutmeg	1 oz.
Marjoram	1 oz.
Mustard	2 oz.

Crush spices, put in a muslin bag, and cook in one gallon of water for 1½ hr. at 170 to 180 deg. F., then remove bag and squeeze dry.

Paprika	½ lb.
Brown sugar	1½ lb.
Tomato puree	1 gal.
Vinegar, full strength	1½ pint
Mapeleine	2 oz.

Directions

Add the sugar to the cooking water, stirring until dissolved. Make a thin paste with the paprika and boiling water, and add this, with the tomato puree, vinegar and mapeleine. Use this mixture for pumping, in the same way a ham is pumped with pickle.

Boil hams at 170 deg. F. for 30 minutes for each pound of ham, cool, then place in shallow pans, sprinkle with brown sugar, and bake in oven at 400 deg. F. until ham is nicely browned.

These hams can be stuffed in cellulose casings to give an attractive appearance and facilitate handling.

For a boneless ham, pump the boned ham in such a way that the liquid will be evenly distributed. Sprinkle a few ounces of dry milk solids throughout the open cuts of the ham. Place in parchment paper lined container, pour a few ounces of the sauce over it, and boil as any other ham. Cool and bake as directed above.

Formula from American Dry Milk Institute.

FORMULA NO. 337

Army Ration C (M-Unit)

Meat and Vegetable Hash

(Type II)

Beef	40 lb.
Pork	10 lb.
Potatoes	48 lb.
Or dehydrated potato cubes	10 lb.
Onions	2 lb.
Salt	21.5 oz.
Celery salt	2.7 oz.
Pepper, black, ground	0.4 oz.

Directions

The meat component shall be based on the weight of the raw meat before braising. Meat shall be ground in a meat grinder fitted with a plate having holes approximately ⅜ in. in diameter. It shall be braised until medium well done, with only enough added moisture to prevent scorching. All juices from the meat shall be included in the finished product. The kinds of meat to be used are explained in Formula No. 305.

The fresh potato component shall be based on the weight of the peeled and trimmed potatoes. Potatoes shall be ground in a grinder fitted with a plate having holes approximately ⅜ in. diameter, or shall be diced into cubes of approximately ⅜ in. in diameter. Dehydrated potato cubes, when used, shall be based on the weight of the dehydrated potato cubes. Dehydrated potato cubes shall be reconstituted in water before using.

Prepare the onions in the same manner used for the preparation of potatoes. The onion component shall be based on the weight of the peeled and trimmed onions. All juices from the ground onions shall be retained and added to the product.

The braised meat, vegetables and

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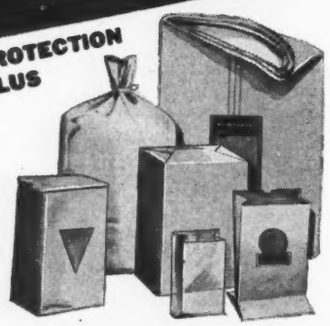

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spices shall be thoroughly mixed. Water may be added, if necessary to bring the moisture content of the finished product within the prescribed range. After thorough mixing, the products shall be filled into tin cans, size 300x308. Each can shall be scored with a key-opening band. The filled cans shall be exhausted, sealed and processed in accordance with best commercial practice. The moisture content of the finished product shall not be less than 72 percent and not more than 76 percent by weight. Net contents of the can shall not be less than 12 oz.

Formula from "Tentative Specifications for M-Units, U. S. Army Field Ration C," Chicago Quartermaster Depot, No. 25B, January 15, 1942.

FORMULA NO. 338

Victory White Cake

Flour	5 lb.
Emulsifying type shortening	2 lb. 12 oz.
Sugar	5 lb.
Salt	3 oz.
Baking powder	7½ oz.
Liquid skim milk	2 lb.
Egg whites	3 lb. 12 oz.
Liquid skim milk	2 lb. 12 oz.
Flavor	To taste

Directions

Mix for 3 to 5 minutes, using slow speed for a three-speed machine or second slowest speed on a four-speed machine. Scrape down at least once during this stage. Add the sugar, salt, baking powder and skim milk to the blended mass and mix for 3 to 5 minutes, scraping down at least once. Mix egg whites, the second portion of skim milk and flavor, and add approximately half to the bowl. Mix until smooth, scrape down, and mix until smooth again. Then add balance of the liquid ingredients and continue mixing for a total of 3 to 5 minutes in this stage, scraping down again to insure a smooth batter.

For a 7-in. layer scaled 10 oz., bake at 375 to 390 deg. F. Using this as a basis, you can determine what temperatures to use for other sizes of cakes.

Formula from Procter & Gamble Bakery Service.

FORMULA NO. 339

Apricot Chiffon Pie

Cream

Apricots (solid pack)	1 No. 10 Can
Granulated sugar	12 oz.
Salt	½ oz.
Cornstarch	5½ oz.
Egg yolks	8 oz.

Cooking Directions

Drain the juice from the apricots and pass the apricots through a fine sieve. Use the juice to dissolve the cornstarch and egg yolks. Place the apricots, granulated sugar and salt in a copper kettle and bring to a full boil, stirring constantly to prevent scorching. Add the cornstarch and sugar dissolved in apricot juice and cook until very thick and smooth. Time the cooking process so that on its completion the following meringue will be ready.

Meringue

Egg whites	1 lb. 4 oz.
Granulated sugar	8 oz.
Gelatine (high grade)	½ oz.
Cold water	4 oz.
Granulated sugar	8 oz.

Mixing Directions

Dissolve the gelatine in the cold water, add to the egg whites and one-half of the granulated sugar (8 oz.), and whip to a dry, light peak. Add the rest of the sugar and stir until it is dissolved. This should take approximately six revolutions of the machine.

Using a wire whip, fold the cooked cream and meringue together lightly. Fill prebaked pie shells.

This will give sufficient filling for eight generously filled 8-in. pie shells. It is not necessary to refrigerate this pie, but it is better served cold.

Formula from General Mills, Inc.

FORMULA NO. 340

Honey Spice Cake

Honey	3 lb. 8 oz.
Liquid skim milk (variable)	5 lb.
Cake crumbs	1 lb. 8 oz.
Ground raisins	12 oz.
Chopped nutmeats (optional)	4 oz.
Whole eggs	12 oz.
Vanilla	½ oz.
Granulated sugar	2 lb. 4 oz.
Standard shortening	1 lb. 8 oz.
Cake flour	5 lb.
Baking powder (variable)	5 oz.
Salt	1½ oz.
Cinnamon	½ oz.
Cloves	½ oz.

Mixing Directions

For best results, have all ingredients tempered so the finished batter temperature will be between 75 deg. and 80 deg. F. Mix together the honey, milk, crumbs, raisins and nutmeats until the cake crumbs are soft. Then place all the ingredients in the mixing bowl in the order that they are named above. Using wire whip, stir all ingredients until they are well incorporated (approximately 15 minutes). Then whip on high speed approximately one minute, or until light and fluffy.

Scale 13 oz. for an 8 in. layer. Quantities given above are sufficient for 24 8-in. layers. Bake approximately 25 minutes at 370 deg. F.

Formula from General Mills, Inc.